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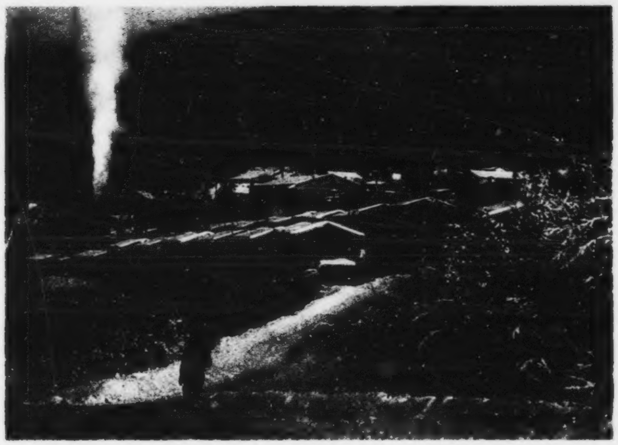

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FRONT COVER

Top right: Dempster Highway, Eagle Plains area; Richardson Mountains to right (Courtesy Bruce Findlay, AES, Downsview)

Bottom left: North Yukon coast, near Babbage River (Courtesy J.C. Anderson, AES, Downsview)

Bottom right: Elsa. (Courtesy DOE, Whitehorse)

BACK COVER

Top left: View from the Fishing Branch River near Bear Cove Mountain (Courtesy D. Yates, AES, Whitehorse)

Top right: Dawson City and Yukon River from Midnight Dome (Courtesy Bruce Findlay, AES, Downsview)

Centre: Red fox taken on secondary peak of Sheep Mountain, Kluane Range (Courtesy Bruce Findlay, AES, Downsview)

Bottom left: Bullion Creek, Sheep Mountain area, Kluane Range (Courtesy Bruce Findlay, AES, Downsview)

Bottom right: Dog team on the Yukon River (Courtesy DINA, Whitehorse)

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climate of yukon

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D.B. Fraser
R.C. Harvey
J.B. Maxwell

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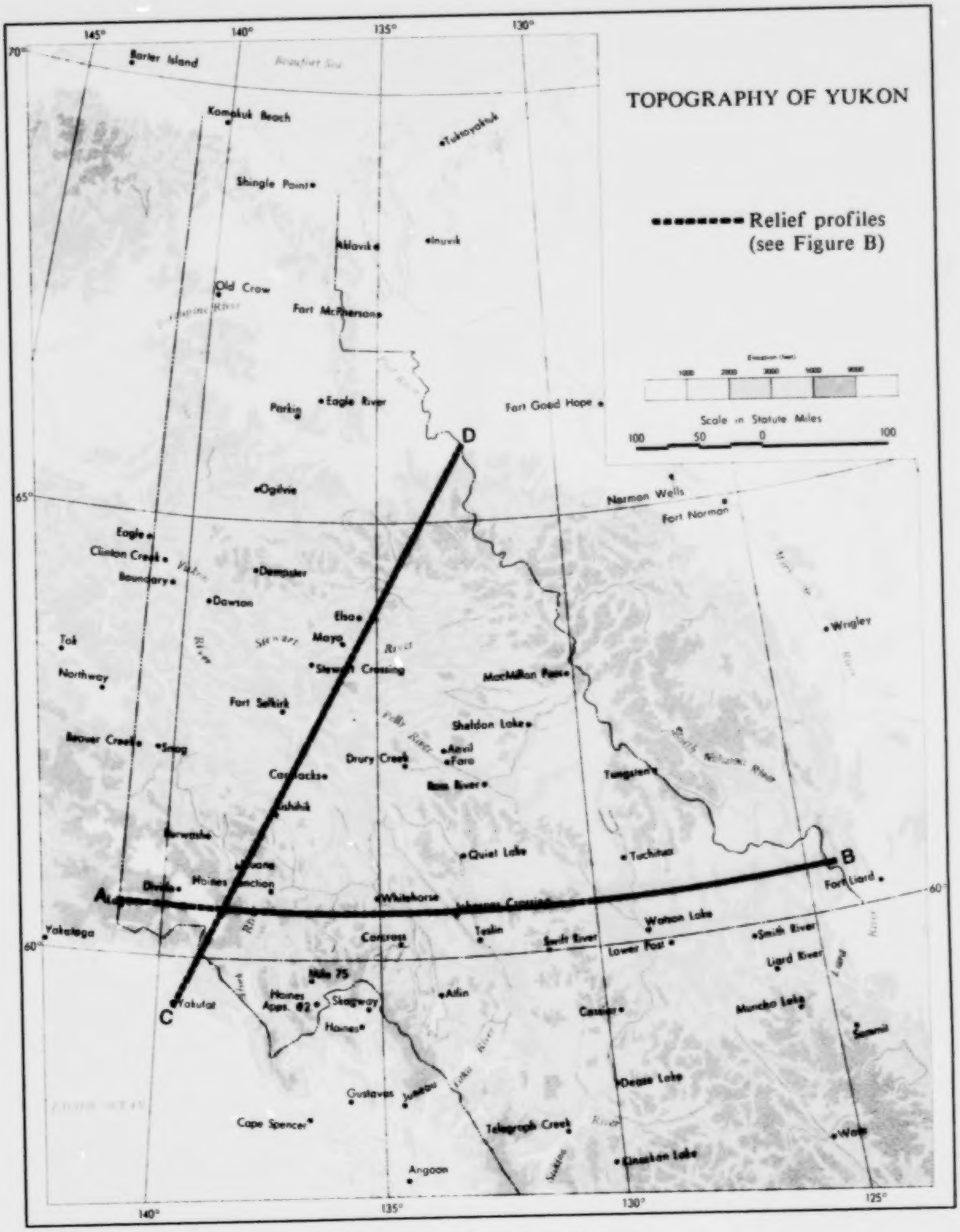
ABSTRACT

This study presents a broad overview of Yukon climate, which is classified as sub-arctic continental. Climatic regions are defined although data are too sparse from the high country to allow rigorous specification of regional differences. Traditional climatological analyses are presented for elements of temperature, wind, precipitation, humidity, cloud, thunderstorms, visibility and obstructions to vision. Normal circulation patterns are depicted and four common synoptic-weather patterns are defined. Analysis includes probability estimates of extremes and duration statistics for maximum and minimum temperatures, daily precipitation and wind speed. The subjects of air pollution potential, wind energy and climatic change are discussed in summary rather than in depth.


TOPOGRAPHY OF YUKON
Relief profiles
(see Figure B)
Scale in Statute Miles
100
50
0
100
145°
140°
135°
130°
125°
70°
65°
60°
Beaufort Sea
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Fort McPherson
Parkin
Eagle River
Fort Good Hope
D
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Wrigley
Tok
Northway
Stewart Crossing
MacMillan Pass
Fort Selkirk
Sheldon Lake
Beaver Creek
Snag
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
Aishihik
Burwash
Quiet Lake
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B
Fort Liard
Otter Falls
Haines Junction
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A
Whitehorse
Johnsons Crossing
Watson Lake
Yakataga
Carcross
Teslin
Swift River
Lower Post
Smith River
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Mile 75
C
Yakutat
Haines Apts. 82
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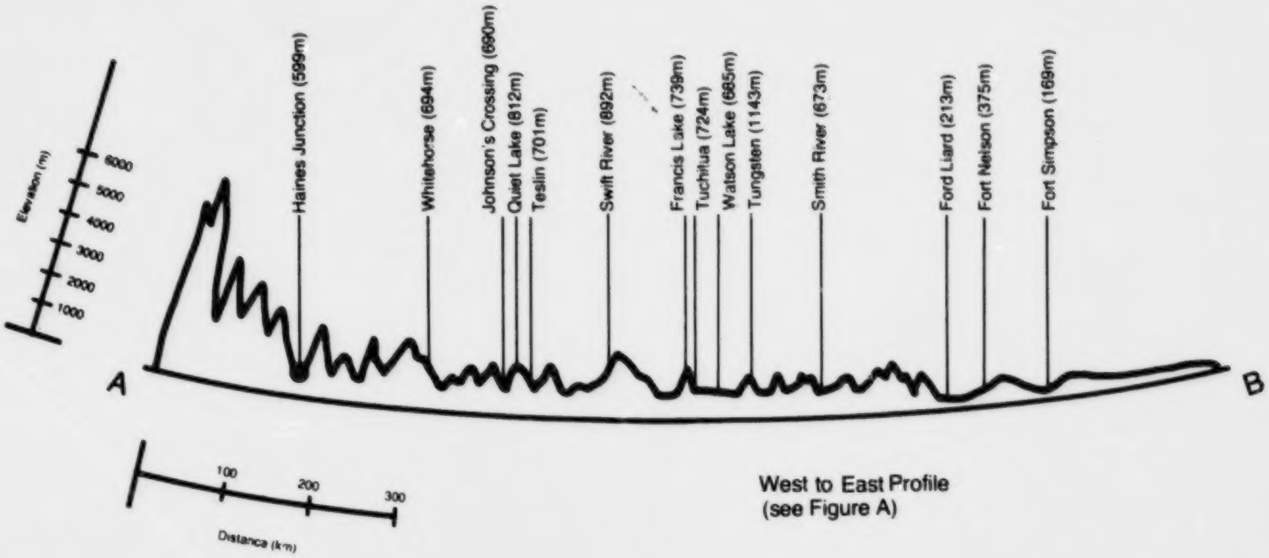
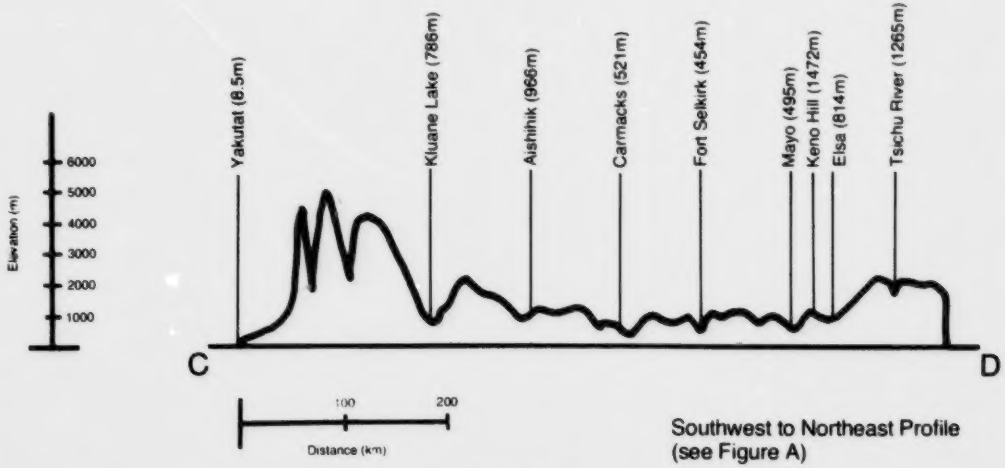
Haines
Atlin
Cassiar
Muncho Lake
Summit
Dease Lake
Gustavus
Juneau
Cape Spencer
Telegraph Creek
Watt
Kinaskan Lake
Angoon
Yukon River
Stewart River
Pelly River
South Nahanni River
Liard River

Figure A   Topography of Yukon

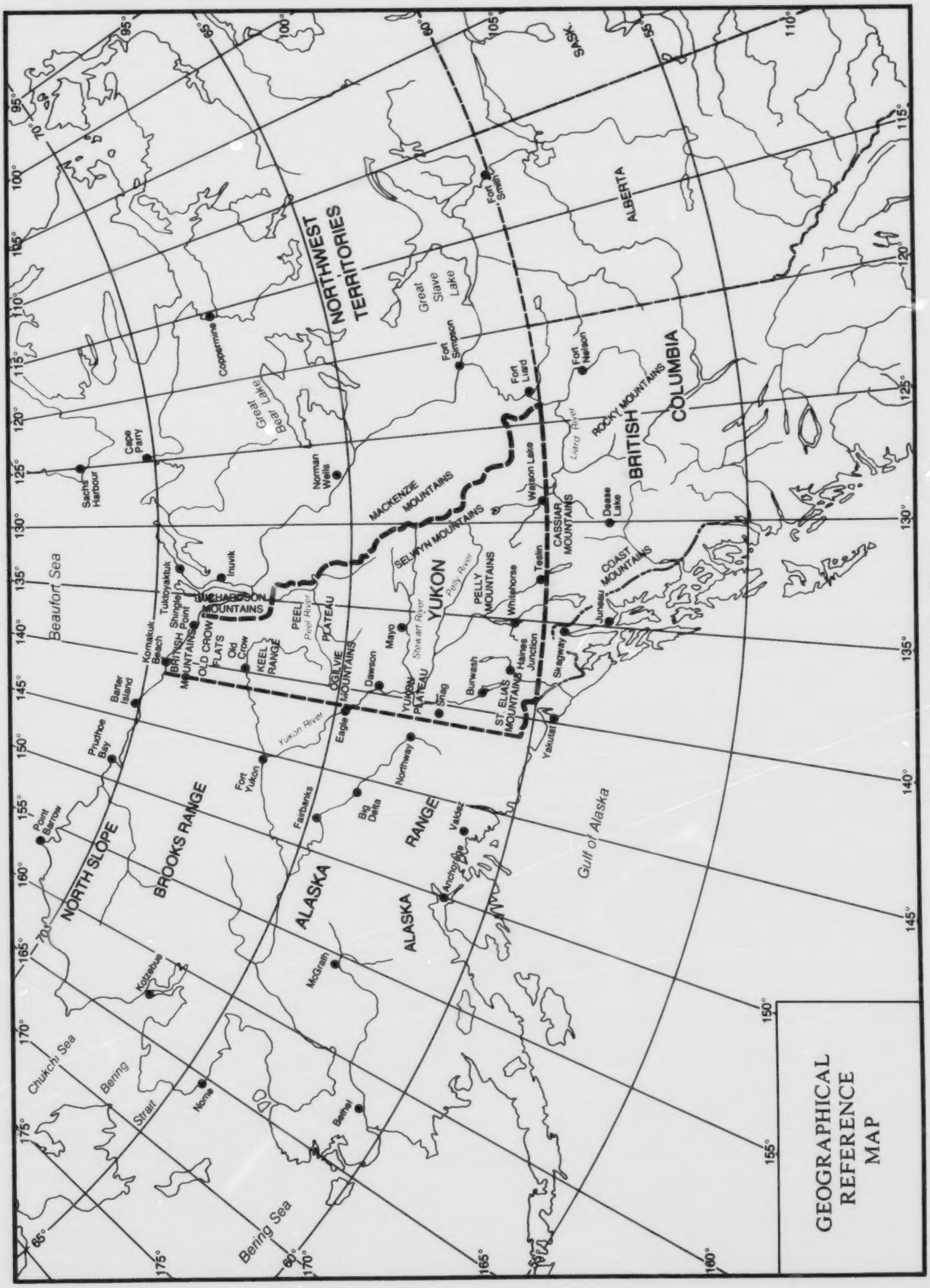


West to East Profile
(see Figure A)



Southwest to Northeast Profile
(see Figure A)

Figure B Relief profiles in Yukon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Beaufort Sea
Chukchi Sea
Bering Strait
Bering Sea
Gulf of Alaska
NORTH SLOPE
BROOKS RANGE
ALASKA
ALASKA RANGE
NORTHWEST TERRITORIES
YUKON
BRITISH COLUMBIA
ALBERTA
SASK.
BRITISH MOUNTAINS
RICHARDSON MOUNTAINS
OLD CROW FLATS
KEEL RANGE
PEEL PLATEAU
OGILVIE MOUNTAINS
YUKON PLATEAU
MACKENZIE MOUNTAINS
SELWYN MOUNTAINS
PELLY MOUNTAINS
CASSIAR MOUNTAINS
ST. ELIAS MOUNTAINS
COAST MOUNTAINS
ROCKY MOUNTAINS
Great Bear Lake
Great Slave Lake
Yukon River
Peel River
Stewart River
Pelly River
Liard River
Point Barrow
Kotzebue
Nome
Bethel
McGrath
Anchorage
Valdez
Fairbanks
Big Delta
Fort Yukon
Northway
Eagle
Prudhoe Bay
Barter Island
Komakuk Beach
Shingle Point
Tuktoyaktuk
Inuvik
Old Crow
Dawson
Mayo
Snag
Burwash
Haines Junction
Whitehorse
Teslin
Watson Lake
Dease Lake
Skagway
Juneau
Yakutat
Sachs Harbour
Cape Parry
Coppermine
Norman Wells
Fort Simpson
Fort Liard
Fort Nelson
Fort Smith
60°
65°
70°
95°
100°
105°
110°
115°
120°
125°
130°
135°
140°
145°
150°
155°
160°
165°
170°
175°

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The authors are indebted to the following:

1. The observers of climatological information especially volunteers and others who gather data in remote areas of Yukon. These include individual lodge owners; farmers and trappers; and employees of mining companies such as Cassiar Asbestos, Amax, Keno Hill and Anvil. Employees at Yukon government maintenance garages, many located in isolated weather sensitive areas, have for many years provided details on weather conditions.

2. D.G. Schaefer, D.W. Phillips and A.S. Mann, Atmospheric Environment Service; B. Janz, Forest Protection Branch, Alberta Forest Service, for review comments at various stages in the preparation of this report.

3. R. Janowicz, Water Resources Division, Indian and Northern Affairs Canada, for provision of recent data on runoff for Yukon.

4. A. Headley, Canadian Climate Centre, for extensive checking and proofreading of text, tables and figures; T. Chivers, G. Young and K. Czaja for their efforts on the mass of drafting that was required for "project 18".

FOREWORD

"The spilling chime-like call of a hermit thrush on a summer's evening . . . The yellow-green of a pine tree against an unending blue sky . . . The range on range of mountains with even the furthest only slightly enshrouded in a softening blue-grey haze . . . The kaleidoscope of colours through the summer as the plants rush through their short seasonal growth. The unrelenting march of the snowline down the mountain side in fall warning of impending winter . . . An immobilized forest covered with the death-like shroud of frost in a mid-winter cold spell . . ."

The natural beauty of Yukon, the quick change from season to season and most significantly the harshness of its winter climate play important roles in the literature relating to Yukon, especially the Klondike gold rush era (Robert Service, Jack London, Pierre Burton). The natural features range from the huge icefields in the majestic mountains of the southwest to the fine boreal forest of the southeast. The significant stands of the south give way northward to the leaning "drunken" forests of the permafrost and the taiga (land of little sticks), the transition zone between the boreal forest and the tundra of the Yukon coastal plain.

Yukon climate is the most variable in North America. It holds the record on the continent for extreme low, -62.8°C at Snag; yet its summer extreme maximum of 36.1°C at Mayo rivals those much further south, due in part to the long hours of daylight. The annual range of extremes at a coastal location such as Vancouver A is -17.8 to 33.3°C, about half that of Yukon.

The climate is as complex as any in the western Cordillera region. The mountainous terrain (Figures A and B) can trap or create severely cold Arctic air in winter to cause lengthy cold spells. On the other hand, mild air from the Pacific does invade Yukon to bring relatively balmy periods of thawing temperatures, especially in the southwest. The massive St. Elias Mountains wring out much of the moisture from the Pacific storms to create a rainshadow in the upper Shakwak Valley and the little desert at Carcross. Yet, precipitation increases again over the southwest slopes of the interior high country. The change from season to season is rapid. For example, in May, one can readily detect day-to-day progress in the greening or leafing-out of hillside stands of aspen or birch.

Previous studies of Yukon climate, in every case, have had to contend with meager data, mostly of short duration. Our knowledge of climate improves with the growth of our data base. The revision of climatological statistics and charts is carried out from time to time as new data, analytical techniques and resources permit.

The Atmospheric Environment Service initiated this project even though data are still sparse in some areas of Yukon, especially for higher elevations and north of the Ogilvie-Wernecke Mountains. However, significant data have been gathered at mining sites, highway maintenance garages and by precipitation storage gauges in remote areas. This encouraged the authors to sub-divide Yukon into nine climatic regions. The regional sub-divisions simplify the descriptive exercise rather than define major climatic distinctions between regions.

The report has been prepared as a support document for planners, engineers, environmentalists and others involved in weather sensitive activities in Yukon. The first six sections relate to history of development, geography, data, climatic controls, and general climate (section 6.1). They are intended for educators, students of geography and climatology, as well as managers and tourists seeking summary information on subjects related to Yukon and its climate.

The last eight sections contain detailed information on climate elements of wind, temperature, precipitation, and other elements; synoptic climatology; as well as summary discussions of air pollution potential and climatic change. They are intended for professionals working in fields where weather dependent applications can contribute to the success of the endeavour.

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1.0 INTRODUCTION

Yukon is a large territory in Canada's rugged northwest. It is somewhat at the same stage as Canada was many decades ago – few people developing and managing a vast diverse area. The present population is near 25,000, 17,000 of whom live in Whitehorse. The population at selected communities is given in Table 1.1. At the peak of the Klondike rush the population in the gold fields was in excess of 30,000. There was a great exodus in the early 1900's and the peak population of 1898 has yet to be equalled.

About 30 years ago Donald P. Kerr prepared reports on the climate of British Columbia and Yukon, as detailed as the data would permit. The Canadian Weather Service, then the Meteorological Branch, Department of Transport, commissioned W.G. Kendrew (1955) to combine these studies into a less detailed production suitable for release to the general public. Yukon was divided into five climatic divisions based on very meager data. Despite this shortcoming the usefulness of the report cannot be questioned.

Hare and Thomas (1974) described the regional climate of Yukon in their text on Canada's various climates. They had not many more stations than Kerr, but the period of record was substantially longer. Also the focus was necessarily on large scale climate, resulting in limited examples of mesoscale (small scale) climate due to their attention to the total nation.

From time to time the Meteorological Branch, now the Atmospheric Environment Service, published climatological atlases and reports depicting Canadian climate in map and tabular form in which Yukon received attention.

It is our human activities that create the need for data networks, resources, and for climatological information. Resource development in Arctic Canada created high priority requirements for detailed climatic studies for regions of impending development so the environmental impact could be determined. Burns (1973, 1974) carried out a study of climate for the Mackenzie Valley-Beaufort Sea region. Maxwell (1980, 1982) completed a similar work for the Canadian Arctic Islands and Adjacent Waters.

This study has a purpose in common with the above. This is particularly due to pipeline projects such as ALCAN and the Dempster lateral systems which sparked interest in Yukon climate information in the late 1970's. A somewhat different approach is taken, however, because Yukon is in the complex Cordilleran region of Canada (Figure 3.1) where climate is extremely dependent on elevation. This can cause large variations over short distances in the horizontal as well as the vertical.

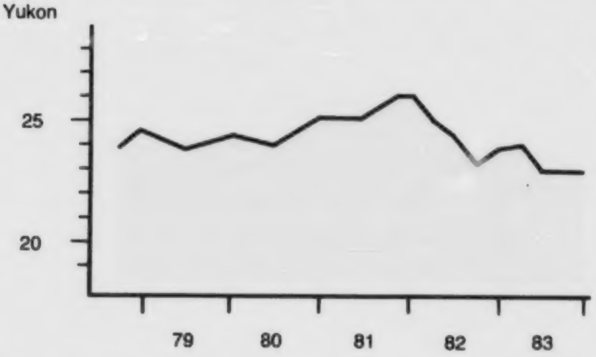
The objective of the authors is to provide an up-to-date handbook on Yukon climate. However, application of climatological information designed to solve weather sensitive problems, has been discussed in other AES publications. Rather than an in-depth treatment, this report will only highlight applications, but wherever possible suggest references for further reading.

Burns (1973, 1974) examined meteorological factors affecting many activities in northern Canada. Janz and Storr (1977) described the climate of the contiguous mountain parks in the southern Cordilleran region. The latter contains a wealth of information, concepts and recommended applications relative to climatology of a mountainous region. Although specific results do not apply to Yukon it is recommended reading. Recreation and tourism applications have been examined in the study of the climate of Kluane National Park (Webber, 1974); similarly for Nahanni National Park (Crowe *et al.*, 1977). The agroclimate capability of southern portions of Yukon has been examined by Eley and Findlay (1977).

TABLE 1.1

POPULATION ESTIMATES TO DECEMBER 31/83
Population (000)

Whitehorse	16,463
Dawson City	1,268
Elsa	274
Faro	1,841
Haines Junction	468
Mayo	448
Watson Lake	1,361



Source: Government of Yukon (1984)

2. HISTORICAL SUMMARY OF DEVELOPMENT

The Klondike gold rush, circa 1898, is no doubt the most abundantly documented period in Yukon history. It was a spectacular era, yet only one of several significant historical events in Yukon development. Much of the documentation is fictional or inaccurate. Some writers would have us believe that survival in a Yukon winter took heroic courage. A few adventurers perished due to lack of knowledge and unpreparedness, but the winter climate does lie within the range of human tolerance. Most problems are related to transportation, mineral extraction, building construction and other technical endeavours.

Long before Yukon became a Territory in 1898, a number of Indian tribes lived in the region and the Eskimos roamed the north slope. Symington (1969) describes where and how they lived. The Kutchin Indians who occupied most of the territory, hunted the barren land caribou each spring. The tribes of the caribou-culture were almost identical in the way they lived, no matter what area of the taiga they called home. The climate mainly determined the flora and fauna, and played a major role in shaping native culture.

Yukon was sparsely populated by its natives due in part to the harsh winter climate. They survived in this area for generations because they acquired a deep understanding of all things in nature. Their hooded parka and moccasin are two time-honored examples of climate applications. Because they understood nature and climate, severe winters were not life threatening. Europe's men and goods first influenced these people via the Pacific; later down the Pelly, Porcupine and Yukon Rivers. As in other areas contact between these diverse groups was in a state of flux between war and trade.

The early history of Yukon has been described by Wright (1976). Duerden (1971) examined the evolution and nature of the contemporary settlement pattern in southwestern Yukon, including the Dawson-Mayo area, from 1840 to 1968. He describes various factors that affected settlements, including their birth, life and in many cases, demise. Climate has been a major factor affecting Yukon development and its evolution.

Central Yukon was essentially unexplored except by its native people until the mid 1800's (Duerden, 1971). The Mackenzie Basin-Great Slave region was occupied by the Hudson's Bay Company. They sent Robert Campbell up the headwaters of the Liard in search of a westward flowing stream which would give them an alternate to the treacherous Liard transport system. He found and named the Pelly in 1840. His route and those of J. Bell are shown in Figure 2.1. Bell, in 1846, was sent from the Mackenzie into northern Yukon. He descended the Porcupine to where it joins the Yukon. In the following years, Ft. Yukon was established at the junction of the two rivers. Ft. Selkirk, built in 1849 where the Pelly joins the Yukon, was sacked by coast Indians in 1852. This slowed exploration and development along the Pelly for a time. When it was proven in 1869 that Ft. Yukon was in Alaskan territory, the fort was abandoned and a new one built at the upper reaches of the Porcupine. The adventurers were aware of gold deposits, but furs were the top priority and many fur bearing animals flourished in the Yukon climate.

The first prospectors entered the territory via the Porcupine in the early 1870's, then a few years later through the Chilkoot pass. These were the shortest routes from the Mackenzie and Pacific respectively. The Chilkoot Pass became the most popular, but not because of its climate which can be inhospitable in any season. Break-up in the headwaters of the Yukon River occurred earlier than further north and at the river mouth. Thus river transport on this route could get the earliest possible start.

There were a few thousand, mostly prospectors, in Yukon before George Washington Carmarcks discovered the richest concentration of placer gold the world has ever known. That was in August, 1896 on Rabbit Creek. Because the winter of 1896 was severe, ships had to wait for spring break-up before they could take evidence of the strike south. The news did not reach the Pacific coast until July 1897. Again because of climate, the stampede north didn't reach its peak until 1898. Thousands crossed the Chilkoot Pass in 1897 but had to wait for break-up in the spring of 1898 to use the arterial waterway to the Klondike. By the time the masses reached the goldfields most of the best claims had been staked by prospectors who had been there for years.

Foot and wagon trails complemented the river transport. A network of supply routes was in place and settlements had sprung up prior to the Klondike gold rush. The Skagway-Chilkoot Pass (or White Pass), was the popular "poor man's route". The Stikine route to the headwaters of the Teslin then down the Yukon River was surveyed by St. Cyr in 1897. The Dalton Trail from Pyramid Harbour over the Chilkat Pass then northward to near Carmacks was surveyed by McArthur in 1897. These are shown in Figure 2.1. The "rich man's route" was up the Yukon by steamship from the Bering Sea.

Dawson climatological records began in 1897. The weather observation system developed slowly. The migratory nature of early mining activity resulted in short-period or intermittent weather records.

The development of the White Pass and Yukon Railway in 1900 alleviated the hardship of hiking Chilkoot Pass, but it accelerated the import of heavy mining equipment. As well, the opening of the winter wagon road from Whitehorse to Dawson in 1902 changed mining techniques, the distribution system, along with settlement patterns. The road was needed to keep supplies moving during the long winter season.

The influx of adventurers peaked in 1898 with various estimates of the population increase in that year being 30,000. Immigration ceased in 1899 and the population fell rapidly in the early 1900's. Mining continued but by large companies using dredges to process an ever increasing amount of gravel to recover the elusive gold. Many prospectors stayed and found other minerals, such as the silver-lead deposits first at Galena Hill and later at many other localities.

Apart from its potential mineral wealth, Yukon had little economic or social incentive for its vast migrant population, (Duerden, 1971). Its climate was adverse, its terrain inhospitable, industry non-existent and although some soil was suitable for agriculture, the climate was not. The winter climate no doubt contributed to the great exodus after 1900. However, many who possessed the frontier spirit and loved the natural beauty and open space stayed on; apparently they had learned that with understanding and preparedness the winter climate can be invigorating and often enjoyable.

The construction of the Alaska Highway from Dawson Creek, B.C. to Fairbanks, Alaska via Whitehorse and the Canol pipeline in the 1940's caused a surge of activity. It also effected a change in the settlement pattern from the central gold field area to along the highway. It became the flight route to Alaska which created needs for hourly weather observations to serve aviation. The completion of the all-weather road from Whitehorse to Mayo in 1950, and later to Dawson, had a severe impact on Yukon River traffic. As transportation routes changed so did the settlements along them. Those communities that were single service centres, for example, serving the river traffic, waned while multi-service centres at hubs of the system grew, so a trend to centralization began. The capital was transferred from Dawson to Whitehorse in 1952. This did not decrease the population of Dawson, but certainly had a positive effect for growth in Whitehorse. Development of the DEW Line in the 1950's improved our knowledge of climate of the north coast as three stations initiated weather observing programs.

Since the mid-sixties, an extensive network of roads and airstrips has developed. Limited permafrost, good drainage and availability of natural road building materials have made Yukon into Canada's land access to the Arctic. Roads connect the Mackenzie Delta to the north Pacific and a lateral network connects most parts of Yukon (Figure 4.1). Sustained growth is linked to modern transportation, which in turn opened up Yukon to what is now her second major industry – tourism. There were almost 400,000 visitors in 1983, a few of whom hiked in over the Chilkoot Trail which is still well marked, partly by the debris of the gold rush days.

Human activities have impacted on the Yukon environment, for example, the denudation of creek beds and hillsides in the Dawson area. Such activities can change the ground thermal conditions and disturb the permafrost. Every facet of development is to some degree weather sensitive and can benefit from a detailed climatological study.

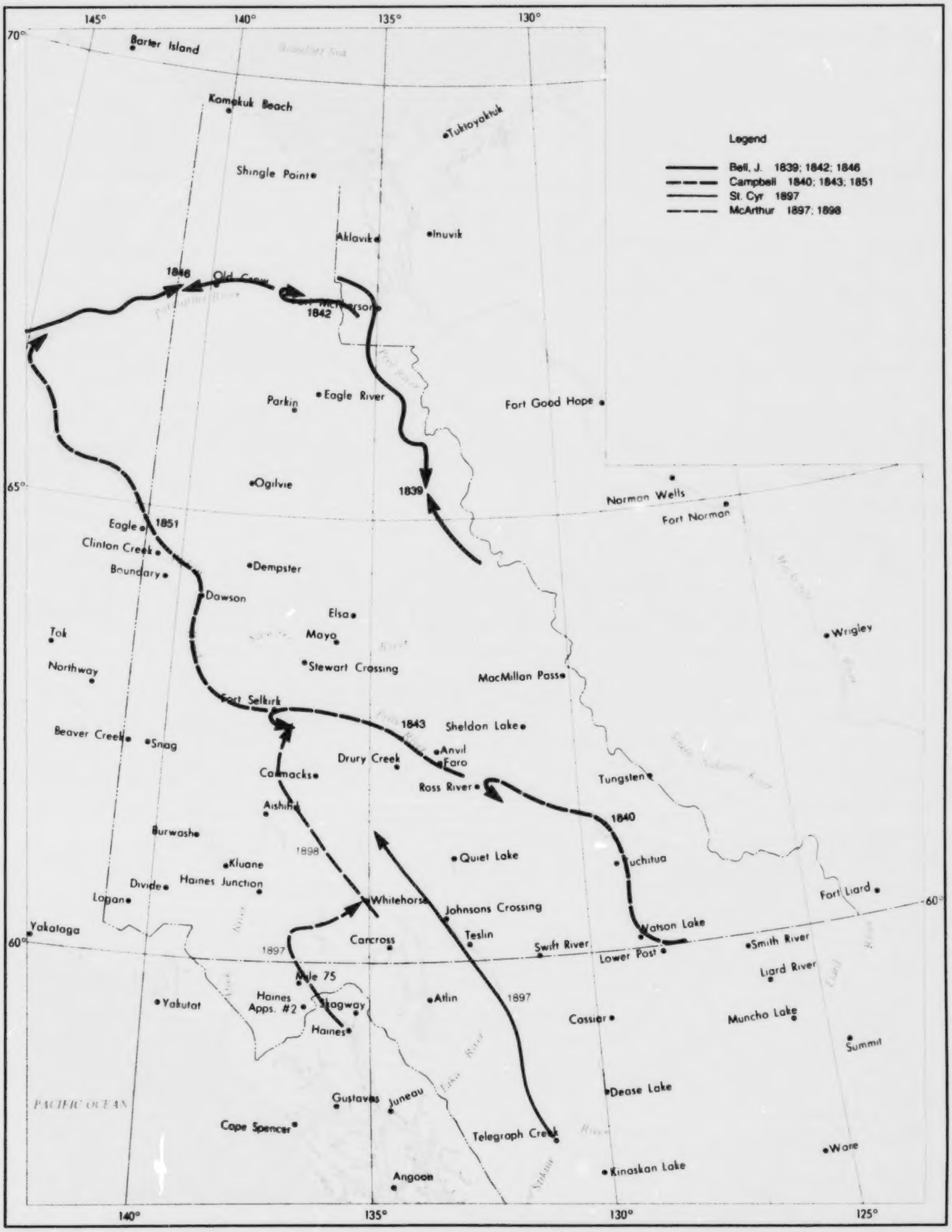

145°
140°
135°
130°
70°
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
Shingle Point
Legend
Bell, J. 1839; 1842; 1846
Campbell 1840; 1843; 1851
St. Cyr 1897
McArthur 1897; 1898
Aklavik
Inuvik
1846
Old Crow
Fort McPherson
1842
Parkin
Eagle River
Fort Good Hope
65°
Ogilvie
1839
Norman Wells
Fort Norman
Eagle
1851
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Tok
Mayo
Wrigley
Stewart Crossing
Northway
MacMillan Pass
Fort Selkirk
1843
Sheldon Lake
Beaver Creek
Snag
Anvil
Drury Creek
Faro
Carmacks
Tungsten
Ross River
Aishihik
1840
Burwash
1898
Quiet Lake
Tuchitua
Kluane
Divide
Haines Junction
Fort Liard
Logan
Whitehorse
Johnsons Crossing
60°
Yakataga
Watson Lake
60°
Carcross
Teslin
1897
Swift River
Lower Post
Smith River
Mile 75
Liard River
Yakutat
Haines Apps. #2
Skagway
Atlin
1897
Cassiar
Muncho Lake
Haines
Summit
Dease Lake
PACIFIC OCEAN
Gustavus
Juneau
Cape Spencer
Telegraph Creek
Ware
Angoon
Kinaskan Lake
140°
135°
130°
125°

Figure 2.1 Exploration and route surveys in northwestern Canada (Dept. Energy, Mines and Resources, 1974)

3. GEOGRAPHY

3.1 Physiographic Regions and Glaciation

Canada is composed of some seventeen geological provinces, which may be grouped into four major categories – continental shelf, platform, orogen and shield (DEMR, 1974). Yukon is almost totally within the Cordilleran orogen, which is identical to the Cordilleran physiographic region (Figure 3.1). This is the large mountain belt of deformed and metamorphosed sedimentary and volcanic rocks mainly of the Phanerozoic and Proterozoic ages. They were produced during various Phanerozoic orogenies 50 to 500 million years ago. The Cordilleran region experiences a rather distinct set of climates that may be considered part of a macroscale (large) climatic region, for example, that defined by Hare and Thomas (1974) (section 6.1).

The Yukon coastal plain is part of the Arctic continental shelf which extends west in a narrow belt along the north Yukon coast. This shelf, one of the youngest provinces, is formed of little-deformed sediments and volcanics, mainly of the Mesozoic and Cenozoic ages, that have and are still accumulating along the margins of the present continental mass.

The Peel Basin is part of the interior platform or interior plains physiographic region formed of thick flat-lying Phanerozoic strata which cover large parts of the Canadian shield. The physiography of Yukon has been described in detail by Bostock (1948). The physiographic regions form, in part, the basis for the climatological divisions defined in chapter 6.

Much of western and northern Yukon was unglaciated during the last ice age, approximately 13,500 yrs ago. This lack of glaciation is one reason for the large rich placer gold deposits in Yukon. The lack of glacial erosion left many of the deposits in place. Other veins or outcrops were displaced by water erosion and deposited in the gravel floor of streams and creeks. On the other hand, southwestern Yukon presently has the largest glaciated area on the continent. The Ice Field Ranges in the St. Elias Mountains contain ice caps, montane, piedmont and valley glaciers as well as areas of permanent snow.

3.2 Topography

Yukon lies in the part of the continental northwest where the western Cordillera curves from a southeast-northwest orientation over British Columbia, westward then southwestward over Alaska. This reorientation has resulted in a chaotic mass of mountains, rough plateaux, and a variety of valleys over Yukon (Figures A and B), yet three main mountainous spines can be identified which have major climatological significance.

First, the St. Elias and Coast Mountains rising abruptly from the Pacific Ocean, transect extreme southwest Yukon. They act as a formidable barrier to the continent's interior. Although several rivers transect this barrier from the interior, the valleys are so narrow and precipitous as to preclude any major movement of Pacific air through them. The Coast Mountains range in elevation from 2000 to 3000m. They terminate over southwest Yukon, but are immediately replaced to the west and northwest by the spectacular St. Elias block. These are the highest mountains in Canada and together form the largest group of great peaks in North America. Out of huge icefields, exceeded in size only in Greenland and the Antarctic, rise Mt. Logan (6050m), Mt. Lucania (5226m), Mt. Steele (5079m) and Mt. Wood (4842m). This block continues west-northwest then southwest over Alaska as the Alaska Range which contains Mt. McKinley, the highest point in the North America. The relief profiles shown in Figure B give an indication of the elevations on a west to east and southwest to northeast swath through Yukon.

The Yukon River basin occupies the broad zone between the St. Elias-Coast Mountains and the second barrier, the interior Cassiar-Pelly Mountains, Figure A. Along the western edge of the basin runs the Shakwak Trench (Figure 3.1). This basin is frequently referred to as the Yukon plateau and extends southeast into B.C. as the Atlin-Stikine plateau. The area is really a rough highland ranging in elevation from 900 to 1500m with numerous disorganized mountains rising to 2000m. Deep, narrow valleys of the Yukon River and its tributaries lace these highlands in a westerly to northwesterly orientation. Long, deep, narrow, glacier-fed lakes occupy the valleys in the extreme northwestern portion of B.C. and southwestern Yukon.

The interior Cassiar Mountains extending northwestward out of central B.C. join with the Pelly Mountains over south-central Yukon to create the second significant spine of mountains. They gradually lose their identity in the Yukon Plateau southeast of Dawson City. They have peaks generally only 1800 to 2200m, with a few near 2500m. Many broad passes do allow air to flow through them yet this mountain group has a significant impact on temperature and precipitation patterns.

Further east, the Rocky Mountain Trench separates the Cassiar Mountains from the Rockies in eastern BC. It opens up into the Liard Basin, which runs west-northwest to east astride the 60th parallel. The Liard plain is about 150 km wide with elevation ranging between 700 and 1000m, but intersected by many northwest to southeast valleys containing the tributaries to the Liard River. The narrow Tintina Trench (Figure 3.1) continues northwest from the Liard plain, between the Pelly and Selwyn Mountains.

The Rockies over northeastern B.C. are rugged with many peaks reaching 2700 to 3000m. The Alaska Highway squirms through the northern part and the narrow 1036m pass at Summit Lake is the highest elevation along the highway.

North of the Liard is the Mackenzie-Selwyn block, which is a broad, rugged chaotic set of mountains with no major dissecting valleys. The eastern Cordillera system consists of the Rockies and the Mackenzie-Selwyn Mountain complex, then curves westward through Yukon to the north of Dawson as the narrowing Ogilvie Mountains, which give way westward to the Yukon plateau near the Alaskan border. Elevation varies from 2500 to 3000m in the eastern system to less than 2200m in the Ogilvies.

The Porcupine Basin-Peel Plateau is an extensive depression occupying most of the interior of northern Yukon. It has a narrow exit in its southeast quadrant occupied by the Peel River and a broader, less organized exit in the northwestern sector where the Porcupine River flows into Alaska. With elevations of 300 to 600m, it is made up of low rolling hills and fairly deep valleys. The exception is Old Crow Flats which occupies the northwestern portion of the basin. This unique feature – an area of innumerable, small, interconnected lakes and swamp – is virtually level and some 100 km in diameter.

The scenic and majestic yet treeless, relatively low Richardson and British Mountains form another curving barrier north and east of the Porcupine-Peel basin, close to the northeastern border and the Arctic coast. The narrow but rugged Richardson Mountains with elevations of 1200 to 1600m along the Yukon-N.W.T. boundary fall to 600 to 900m near the north coast. To the west, heights rise to 1200-1500m within the British Mountains, the eastern extension of the great Brooks Range in northern Alaska.

The Yukon Coastal Plain along the Arctic slope is narrow, ranging only 10 to 20 km in width then rising to the rolling foothills of the Richardson and British Mountains. A number of large streams, notably the Firth have developed alluvial fans along the coastal plain. One large, low-lying island, Herschel Island, lies just off the coast.

3.3 Arctic and Pacific Drainage

The Arctic and Pacific drainage basins in Yukon and neighbouring territory are shown in Figure 3.2. The divide separating these drainage basins meanders north through the Cassiar-Pelly Mountains, turns northeast to the border then extends northward on the Y.T.-N.W.T. border. It turns sharply west from the Selwyn Mountains through the Ogilvies. It then circumvents the Porcupine Basin via the Richardson and British Mountains. The divide is a significant topographic feature affecting the precipitation climate. Also, the boundaries of drainage basins are sometimes used to outline climate districts (section 4.2.2.).

3.4 Permafrost and Soil Climate

Permafrost is defined as the thermal condition of earth materials, such as soil and rock, that occurs when their temperature remains below 0°C continuously for at least 2 years. Measurements of the thickness of permafrost have been made at several locations

(Brown, 1972; Judge, 1973). The extent of permafrost in Yukon and neighbouring Canadian territory is shown in Figure 3.3.

Between the perennially frozen earth material and the ground surface is an "active layer" which freezes in winter and thaws in summer; it is generally less than 1 m in depth. The thawing process results in "wet" permafrost. Climate, terrain, and ground cover are important factors in determining the thickness of the active layer. Generally speaking it becomes thinner northward in response to the decrease in degree days of thawing (section 8.6). Vegetation grows above the permafrost layer, yet where it is absent the depth of thaw is greatest. Also, the layer reaches its greatest depth in coarse-grain soil with low moisture content, in bedrock, and on south-facing slopes.

In addition to imposing a severe handicap on mobility, particularly during the thaw period when tundra areas may be impassible for surface forms of transport, the regime of permafrost is particularly sensitive to disturbance. Surface fissures and breaks, river or sea action, trampling, cultivation, and construction can all expose the deeper, high ice-content soils to heat, with a resultant change in the surface active layer. The formation of bogs and small lakes is one possible result of a deepening of the active layer. Such melting can produce serious handicaps in activities relating to the construction and maintenance of buildings, pipelines, sewage lines, roads and airfields. Special construction techniques need to be employed; even then foundations may shift periodically.

The dominant land type in Yukon is made up of soil areas characterised by excessive stoniness and/or rock outcrops (DEMR, 1974). A primarily rockland type prevails over the British and Richardson Mountains, the Pelly-Cassiar as well as the Coast-St. Elias Mountains, the latter complex having extensive ice cover. Land suitable to limited agricultural use does occur.

Soil climate responds to changes in aerial (atmospheric) climate but these changes are affected in time and degree by the water content, depth, surface cover, landscape position and man's manipulation of the soil. Plant growth depends on the total climate, both aerial and soil climate. According to the classification system for Canada and the United States, most of Yukon is in the sub-arctic class which has sporadic permafrost; northern Yukon is in the arctic class where permafrost is continuous.

In terms of soil moisture, Yukon is almost entirely in the humid class of the moist unsaturated regime; the soil is generally not dry in any part as long as 90 consecutive days in most years, yet shows a very slight water deficit in the growing season. Small areas are classed aquic – soil saturated for moderately long periods.

3.5 Vegetation

Vegetation regions of Yukon are depicted in Figure 3.4. The vegetation consists primarily of boreal forest and alpine as well as arctic tundra (Oswald and Senyk, 1977). Trees cover most of the plateaux and valleys in the south up to elevations of 1350 to 1500m in the southeast, and 1050 to 1300m in the southwest. The tree line lowers to around 600 to 750m on the north slopes of the Ogilvies and trees are confined to the valley floor below 450m in the Old Crow Basin. The Richardson and British Mountains are treeless except in the lowest protected valleys. The tree line has its furthest northern extension in the valley of the Firth River, almost to the Yukon coastal plain.

The greatest number of tree species exists in southeastern Yukon where white spruce, black spruce, larch, alpine fir, lodgepole pine, aspen, balsam poplar and paper birch abound. To the west and north the stands gradually become more open and discontinuous. Shrub communities exist both within the forest canopy as well as the tundra areas. Tussock fields either of sedge or cotton grass occur in southern Yukon but increase in ground coverage northward to form, together with the mosses and lichens, the dominant vegetation of the arctic tundra.

According to the Department of Energy, Mines and Resources (1974), more than seventy five percent of Yukon forests are softwood. The volume of standing wood is approximately 1.2% of the national inventory. The best commercial standards are in the Liard

Basin-southern Selwyn-Mackenzie Mountain area with some stands up to 35m tall having a diameter at breast height (DBH) of 0.6m. Approximately 88% of the stands have a DBH of 10 to 22 cm, only 12% have a DBH of 25 cm or more. In early history almost every settlement of any consequence had a sawmill. Today the greatest number of mills is in the southeast where the best timber is found.

Some potential agricultural areas are depicted in Figure 3.5. More recent work by Eley and Findlay (1977) concludes that there are no extensive areas having a suitable climate for subsistence agriculture. In addition to the areas shown in Figure 3.5, however, the latter study found that narrow bands of marginally useful land exist along most major rivers of Yukon and around Watson Lake.

Smith (1984) pointed out that there are many thousands of hectâres of soil suitable for grain production that can not be used because of climate constraints. The best climates for northern agriculture are found on terrain convex in shape, or at low elevations on sunny slopes, preferably near a large river or lake, where frost-free days may be locally longer. Low lying concave hollows in valley bottoms are favourable sites for cold air drainage and for cold arctic air masses to become trapped. As a result, they tend to be prone to the occurrence of frost and permafrost, and are not suitable for cultivation.

3.6 Wildlife

One of the many attractions to Yukon residents and visitors alike is the abundance of wildlife. At the time of writing, the bear, wolf and caribou populations are thriving, but there is serious concern about the recent depletion of moose.

The quadrupeds outnumber the human population several fold. For example, the Porcupine Herd of barren land caribou, resident in northern Yukon, comprises well over 100,000 head. On the other hand, the Osborne Herd of woodland caribou on the Burwash Uplands is quite small. The well-being of all wildlife and their habitats is directly related to day-to-day weather and long-term climate. Detailed knowledge of snow pack, its depth and density, also wind and temperature patterns is extremely important in the development of wildlife management plans.

A varied population of animals dwells in Yukon. The inventory of wildlife and the classification of ecological land units are being updated (Kuhn, 1984). The description here is not intended to be complete. There are many species of rodents, including marmot, pika, lemming, and squirrel down to the ever present mouse. Some mammals such as beaver, muskrat and mink can be found almost everywhere except north of the British Mountains. Fauna size varies from other small fur bearers such as ermine and marten to the fox, coyote, lynx, goat, mountain sheep, caribou, wolf, wolverine, bear and moose. Southern Yukon is the northern limit for the cougar and mule deer, with only infrequent sitings. Arctic and red fox live in northern Yukon, while red fox only is found in the south. The large Porcupine herd of barren ground caribou roams northern Yukon and Alaska while small herds of woodland caribou have established habitats in the south, for example on uplands of the St. Elias and Coast Mountains, also in southeastern Yukon. Polar bear travel the Arctic coast; grizzly and black bear are found elsewhere. Mountain sheep are quite common while mountain goats reside at higher elevations in the St. Elias and Coast Mountains as well as on ranges in southeastern Yukon.

Some 200 species of birds are recognized in Yukon, from golden eagles to ducks to finches. Thirty species are resident throughout the year, for example, the grouse, jay and finch families as well as ravens, chickadees, some owls, and the gyrfalcon. The fifteen percent resident figure (annual residents x 100/total recognized) is high compared to the Prairies and the N.W.T. This is due, in part, to the proximity of the Pacific coast to which some species temporarily migrate during exceptional cold spells. Yukon, as is the case with most sub-arctic areas, is heavily used by many migratory birds for nesting in summer. Northern plants and insects have proven to be an adequate and dependable food supply for both parents and their fledglings. Unfortunately the birds do not truly have much impact on reducing the pesky hordes of mosquitos and black flies that infest the wilderness during the warm season.

The Yukon and Alsek Rivers west of the Arctic-Pacific divide are spawning grounds for salmon. The most abundant fresh water fish include lake whitefish, lake trout, northern pike, and grayling; the Arctic Char is found in rivers on the north slope. Rainbow trout are found naturally only in the Alsek River while Dolley Varden are in the Alsek and Liard systems.

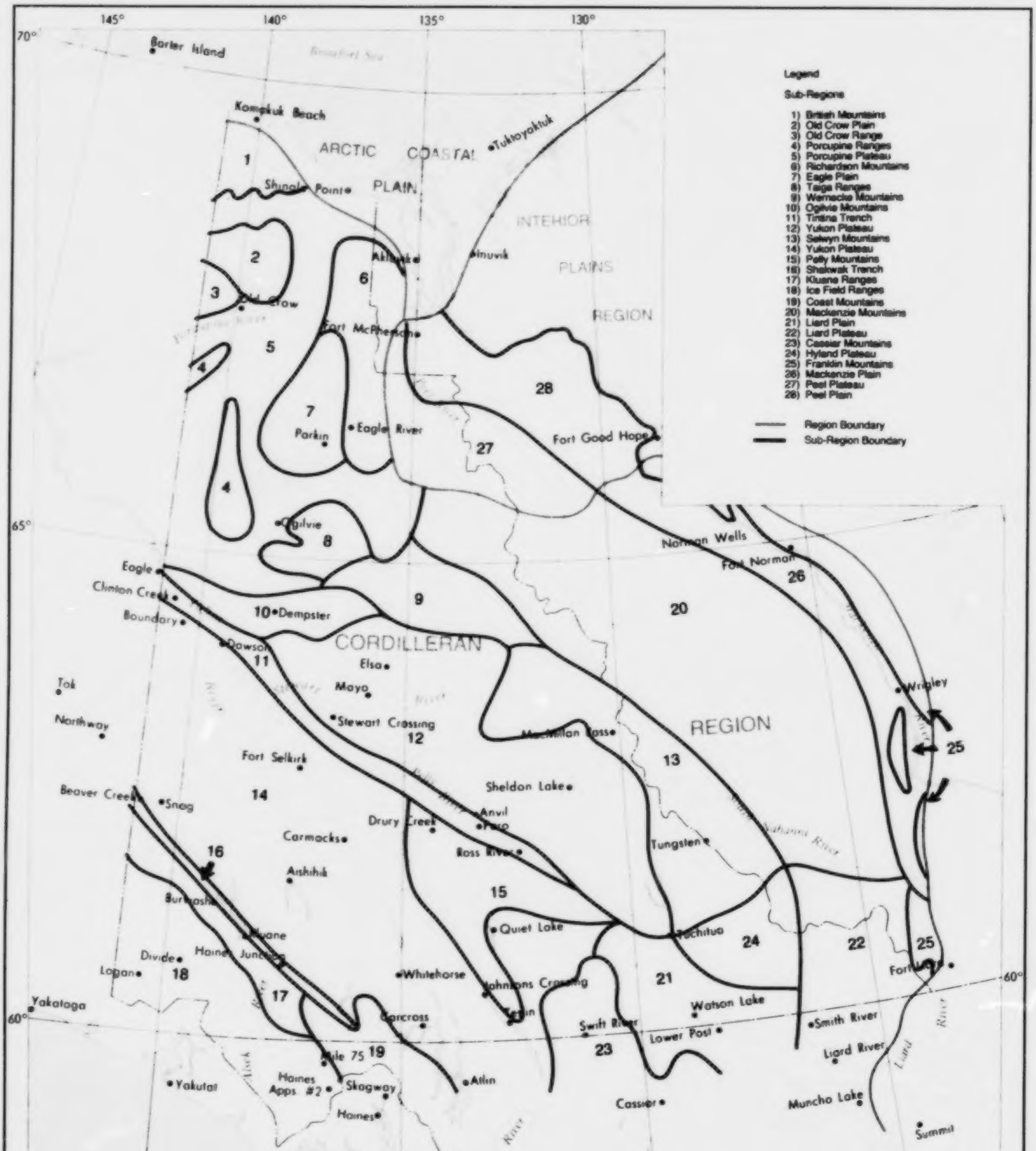

Legend
Sub-Regions
1) British Mountains
2) Old Crow Plain
3) Old Crow Range
4) Porcupine Ranges
5) Porcupine Plateau
6) Richardson Mountains
7) Eagle Plain
8) Taiga Ranges
9) Wernecke Mountains
10) Ogilvie Mountains
11) Tintina Trench
12) Yukon Plateau
13) Selwyn Mountains
14) Yukon Plateau
15) Pelly Mountains
16) Shakwak Trench
17) Kluane Ranges
18) Ice Field Ranges
19) Coast Mountains
20) Mackenzie Mountains
21) Liard Plain
22) Liard Plateau
23) Cassiar Mountains
24) Hyland Plateau
25) Franklin Mountains
26) Mackenzie Plain
27) Peel Plateau
28) Peel Plain
Region Boundary
Sub-Region Boundary
ARCTIC COASTAL PLAIN
INTERIOR PLAINS REGION
CORDILLERAN REGION
PACIFIC OCEAN
Beaufort Sea
145°
140°
135°
130°
125°
70°
65°
60°
Barter Island
Komakuk Beach
Shingle Point
Tuktoyaktuk
Aklavik
Inuvik
Old Crow
Fort McPherson
Eagle River
Parkin
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Tok
Northway
Stewart Crossing
Fort Selkirk
Macmillan Pass
Wrigley
Sheldon Lake
Beaver Creek
Snag
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Haines Junction
Divide
Logan
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Teslin
Carcross
Watson Lake
Smith River
Swift River
Lower Post
Liard River
Mile 75
Haines Apps #2
Skagway
Atlin
Yakutat
Haines
Cassiar
Muncho Lake
Summit
Dease Lake
Gustavus
Juneau
Cape Spencer
Telegraph Creek
Kinaskan Lake
Ware
Angoon

Figure 3.1 Physiographic regions of Yukon and surrounding Canadian territory (Dept. Energy, Mines and Resources, 1974)

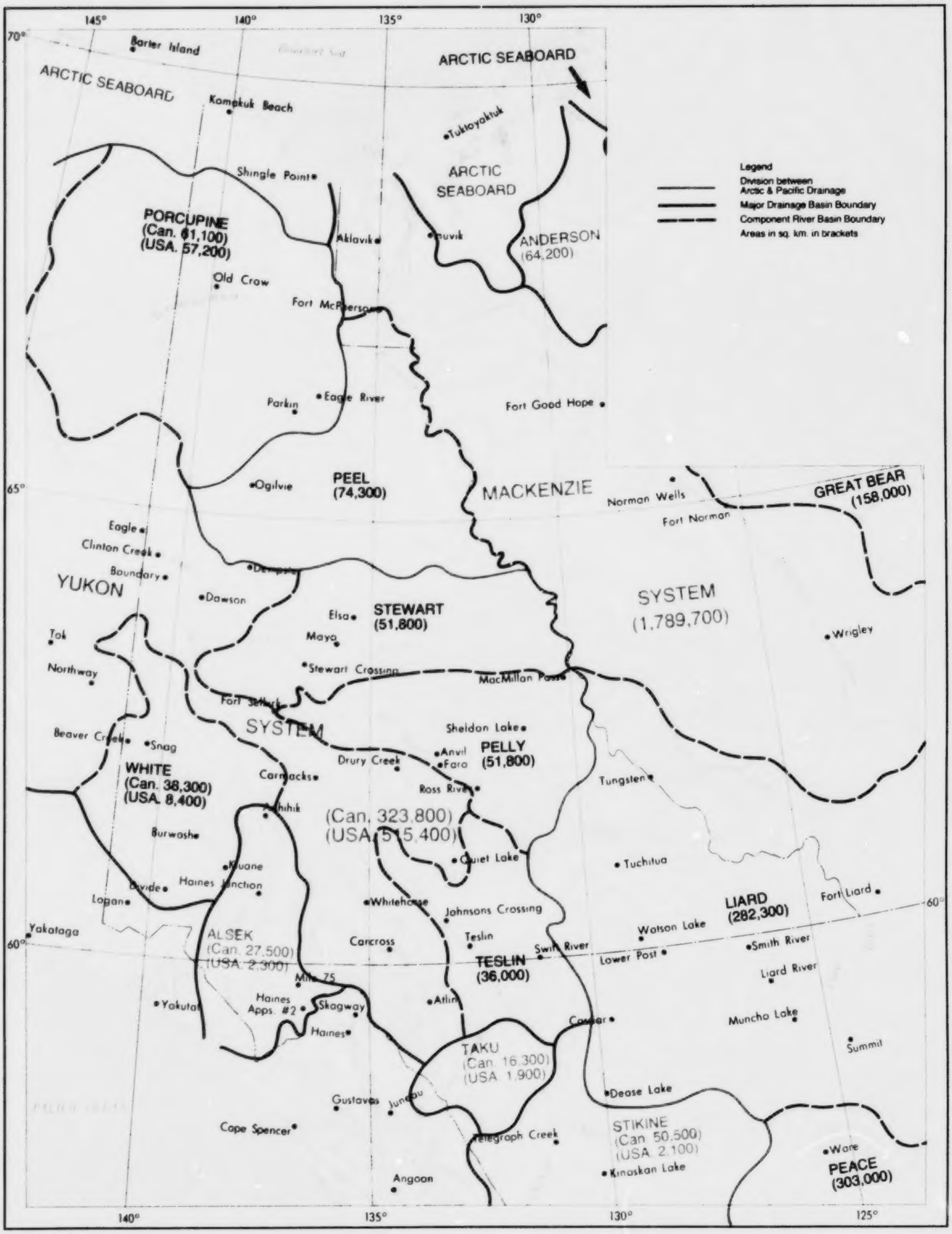

145°
140°
135°
130°
70°
65°
60°
125°
Barter Island
ARCTIC SEABOARD
Komakuk Beach
ARCTIC SEABOARD
Tuktoyaktuk
ARCTIC SEABOARD
Legend
Division between Arctic & Pacific Drainage
Major Drainage Basin Boundary
Component River Basin Boundary
Areas in sq. km. in brackets
Shingle Point
PORCUPINE
(Can. 61,100)
(USA. 57,200)
Aklavik
Inuvik
ANDERSON
(64,200)
Old Crow
Fort McPherson
Parkin
Eagle River
Fort Good Hope
Ogilvie
PEEL
(74,300)
MACKENZIE
Norman Wells
Fort Norman
GREAT BEAR
(158,000)
Eagle
Clinton Creek
Boundary
YUKON
Dempster
Dawson
Elsa
STEWART
(51,800)
SYSTEM
(1,789,700)
Tok
Mayo
Wrigley
Northway
Stewart Crossing
MacMillan Pass
Fort Selkirk
SYSTEM
Sheldon Lake
Beaver Creek
Snag
Anvil
Faro
PELLY
(51,800)
Drury Creek
WHITE
(Can. 38,300)
(USA. 8,400)
Carmacks
Ross River
Tungsten
Aishihik
(Can. 323,800)
(USA. 515,400)
Burwash
Quiet Lake
Tuchitua
Kluane
Divide
Haines Junction
Logan
Whitehorse
Johnsons Crossing
LIARD
(282,300)
Fort Liard
Yakataga
ALSEK
(Can. 27,500)
(USA. 2,300)
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
TESLIN
(36,000)
Mile 75
Liard River
Yakutat
Haines Apps. #2
Skagway
Atlin
Cassiar
Muncho Lake
Haines
TAKU
(Can. 16,300)
(USA. 1,900)
Summit
Dease Lake
Gustavus
Juneau
Cape Spencer
Telegraph Creek
STIKINE
(Can. 50,500)
(USA. 2,100)
Ware
Kinaskan Lake
PEACE
(303,000)
Angoon

Figure 3.2 Drainage basins in Yukon and some neighbouring territories (Dept. Energy, Mines and Resources, 1974)

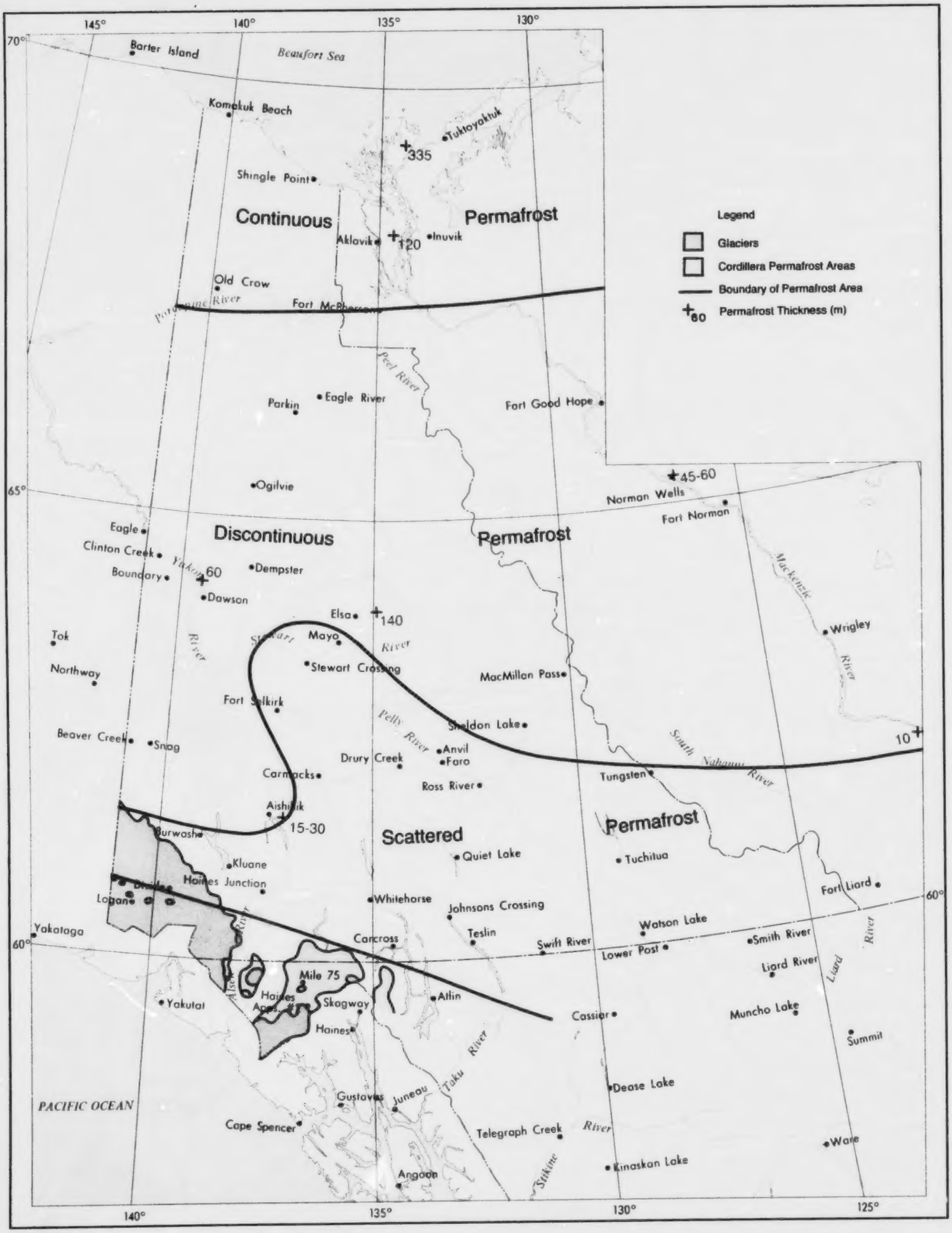

145°
140°
135°
130°
70°
65°
60°
125°
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
335
Shingle Point
Continuous
Permafrost
Aklavik
120
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
45-60
Norman Wells
Fort Norman
Ogilvie
Eagle
Discontinuous
Permafrost
Clinton Creek
Yukon
60
Dempster
Boundary
Dawson
Mackenzie
Elsa
140
Tok
Mayo
Stewart
River
Wrigley
River
Stewart Crossing
Northway
River
MacMillan Pass
Fort Selkirk
Pelly
River
Sheldon Lake
10
Beaver Creek
Snag
Anvil
Faro
Drury Creek
South Nahanni
River
Carmacks
Ross River
Tungsten
Aishihik
15-30
Burwash
Scattered
Permafrost
Quiet Lake
Tuchitua
Kluane
Haines Junction
Fort Liard
Whitehorse
Johnsons Crossing
Logan
Yakataga
Teslin
Watson Lake
Carcross
Swift River
Lower Post
Smith River
Liard River
Liard
River
Mile 75
Haines
Skagway
Atlin
Yakutat
Haines
Cassiar
Muncho Lake
Summit
Taku
River
Dease Lake
Gustavus
Juneau
PACIFIC OCEAN
Cape Spencer
Telegraph Creek
River
Ware
Stikine
Kinaskan Lake
Angoon
140°
135°
130°
125°
Legend
☐ Glaciers
☐ Cordillera Permafrost Areas
Boundary of Permafrost Area
Permafrost Thickness (m)

Figure 3.3 Permafrost in Yukon and neighbouring territories (Dept. Energy, Mines and Resources, 1974)

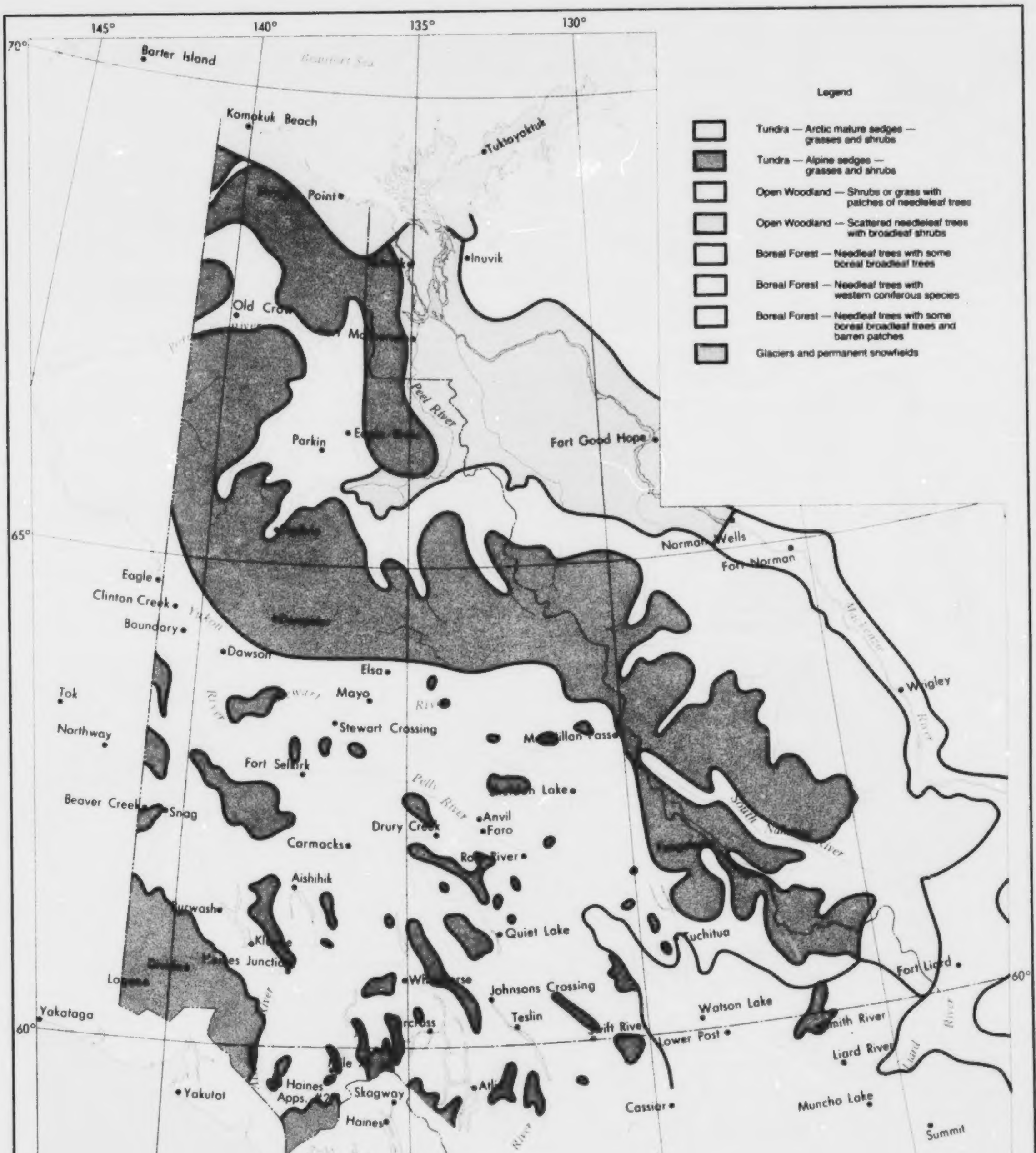

Legend
Tundra — Arctic mature sedges — grasses and shrubs
Tundra — Alpine sedges — grasses and shrubs
Open Woodland — Shrubs or grass with patches of needleleaf trees
Open Woodland — Scattered needleleaf trees with broadleaf shrubs
Boreal Forest — Needleleaf trees with some boreal broadleaf trees
Boreal Forest — Needleleaf trees with western coniferous species
Boreal Forest — Needleleaf trees with some boreal broadleaf trees and barren patches
Glaciers and permanent snowfields
145°
140°
135°
130°
125°
70°
65°
60°
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
Inuvik
Old Crow
Peel River
Parkin
Fort Good Hope
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dawson
Elsa
Mayo
Tok
Northway
Stewart Crossing
Fort Selkirk
Beaver Creek
Snag
Carmacks
Drury Creek
Anvil
Faro
Pelly River
South Nahanni River
Aishihik
Quiet Lake
Tuchitua
Johnsons Crossing
Teslin
Watson Lake
Lower Post
Fort Liard
Wrigley
Smith River
Liard River
Yakataga
Yakutat
Haines
Skagway
Cassiar
Muncho Lake
Summit
Dease Lake
Gustavus
Juneau
Cape Spencer
Telegraph Creek
Kinaskan Lake
Angoon
Ware
PACIFIC OCEAN

Figure 3.4 Vegetation regions in Yukon and neighbouring territories (Dept. Energy, Mines and Resources, 1974)

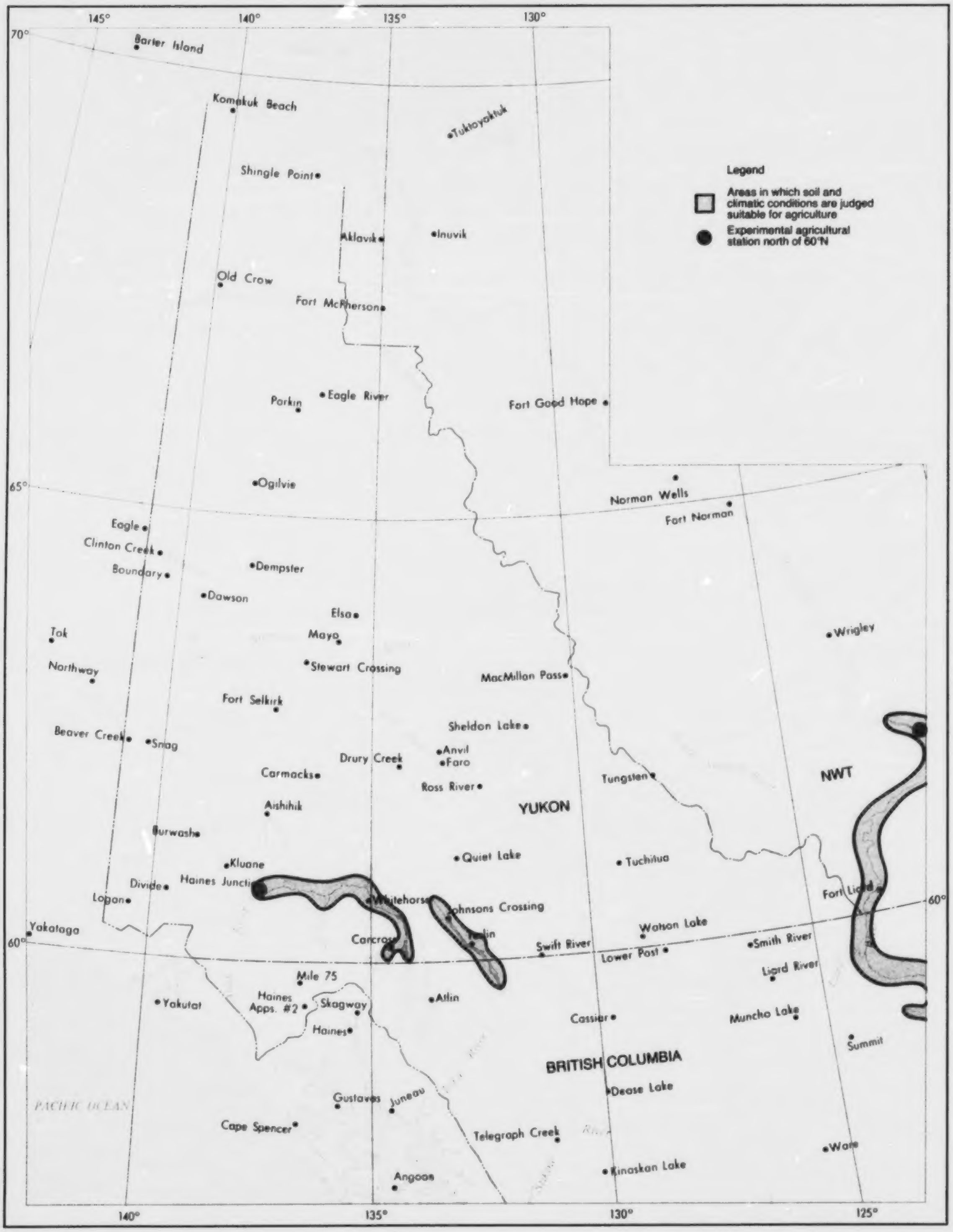

145°
140°
135°
130°
70°
65°
60°
125°
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Fort McPherson
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Tok
Northway
Stewart Crossing
MacMillan Pass
Wrigley
Fort Selkirk
Beaver Creek
Snag
Sheldon Lake
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
NWT
Aishihik
YUKON
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Whitehorse
Johnsons Crossing
Fort Liard
Logan
Yakataga
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Mile 75
Haines Apps. #2
Skagway
Atlin
Yakutat
Haines
Cassiar
Muncho Lake
Summit
BRITISH COLUMBIA
Dease Lake
PACIFIC OCEAN
Gustavus
Juneau
Cape Spencer
Telegraph Creek
Ware
Kinaskan Lake
Angoon
Legend
Areas in which soil and climatic conditions are judged suitable for agriculture
Experimental agricultural station north of 60°N

Figure 3.5 Areas in Yukon judged suitable for agriculture (Dept. Energy, Mines and Resources, 1974)

4. SOURCES OF DATA AND ANALYSIS PROCEDURES

Data sources are sparse in northern Yukon and at high elevations. Even where long-term records exist, in most cases, they do not include all elements, for example, wind observations. As well, hourly observations are generally only undertaken at airports and may be discontinuous. These limitations, of course, impact on the type and depth of analysis that can be carried out.

4.1 Data

4.1.1 *Observed Data*

Long-term climatological data are limited to only six stations with continuous records longer than 30 years. Dawson's record began in 1897 but was intermittent until 1901. Observations from Mayo started in 1925 and at Haines Junction, Teslin, Watson Lake and Whitehorse continuous records data back to the late thirties and early forties. Some stations like Atlin, B.C., and Carcross started near 1900 but have breaks in their records.

It wasn't until the fifties that road and airstrip construction allowed the development of a climatological network of reasonable density. This was possible only because of excellent cooperation the weather service received from private industry and other government departments.

Primarily, data from 32 locations in Yukon were used in this study, only 21 of which have 15 or more years of continuous record. Twelve stations in northern B.C. and a few from the N.W.T. and Alaska were also utilized. Upper atmosphere observations for Whitehorse, Ft. Nelson, Norman Wells, Inuvik, Barter Island, Northway, Fairbanks, and Yakutat provided useful data even though only one is in Yukon.

A directory of short-term stations is given in Appendix B. The locations of upper air and surface station locations are given on Figure 4.1. Locations of snow courses and remote reading precipitation gauges are given in Appendix C.

4.1.2. *Adjusted Data*

In order to determine the climate over the complex topography of Yukon, it is necessary to utilize data from all sources, even those stations with short-period records.

The World Meteorological Organization has recommended that climate normals be based on averages over 30 years, a rather arbitrary decision adopted several years ago. The current normal period is 1951 to 1980. The Canadian Climate Centre utilizes a statistical method to adjust data for short-period stations to make them comparable with those for the full period. In the new set of Canadian normals, the adjustment was made whenever a station had 5 to 19 years of data in the 1951 to 1980 period. Additional available data from the period 1931 to 1950 were also used to adjust station normals over the current standard period.

4.1.3. *Evaluation of Data Sources*

Data errors are usually classified as instrumental, observational, sample and bias. Some are random and cancel out over the long-term; others can be significant if they occurred for a single extreme event (McKay and Thomas, 1971). Non-random errors, for example, those due to faulty instrument maintenance, poor judgement of an observer especially in measurement of snow cover, are difficult to determine. Precipitation gauges may consistently undercatch the fall which creates a bias in the data set, or the observation site may not represent climate conditions of significant areal extent, a common fault in mountainous terrain.

In this study some short-term precipitation data were not used because the data record was less than five years, the instrument location had a bias or the quality of the observations was questionable. Such decisions were made subjectively based on the long term synoptic and climatological experience of the authors.

The station density for southern Yukon (south of 64°N) is actually quite good with 29 of 32 stations in the triangular shaped area of roughly 200,000 sq km. This gives an areal spacing of 80 to 85 km between stations. However, north of 64° N there are only 3 stations with significant data, two of which are on the Arctic coast. This leaves Old Crow to represent some 110,000 sq km or a spacing of 330 to 335 km. Needless to say the confidence factor in climatological information for north of 64°N is much lower than for the southern Yukon.

4.2 Analysis Procedures

4.2.1 *Climate Normals and Extreme Values*

Stations with record lengths between 20 and 29 years invariably yield arithmetic average values that differ only slightly from the 30 year mean so such records are simply averaged, i.e. no adjustment made.

The use of 30 years produces fairly constant values with little difference occurring between successive normal periods. However, it should be noted that the choice of 30 years and the use of the term "normal" can be misleading.

The number of years needed to obtain a stable normal value depends on the element, season and region. Also the period of record is related to the purpose. For example, if statistics are intended to represent average conditions over the very recent past, for say short-term forecasting, then a record of 10 to 15 years lessens the possibility of inconsistencies in the time series arising from changes in station location and other non-random factors. On the other hand, for studies of climate variability it is desirable to use the longest possible period of record, based on both instrumental and historical records.

Landsberg (1951, cited by McKay and Thomas, 1971) has determined the approximate number of years of data needed to obtain a stable frequency distribution, shown in Table 4.1. It is important to note that in mountainous terrain longer periods of record are required for all climatic elements examined relative to areas of uniform relief at lower elevations.

In the initial stages of this study much preliminary work was based on average values over the period 1959 to 1978. Later it was decided to utilize the W.M.O. normal period 1951 to 1980. The charts of mean values of temperature and precipitation were based on the initial period then adjusted where necessary to fit the current normal period. Wherever the data base differs from the standard period a suitable notation is made.

The classical approach to conducting extreme value analysis requires long-term continuous records. The required record length is directly dependent on the life span of the facility being designed. Those expected to last 35 years or more are usually based on not less than 15 years of data. This is generally not possible but such analyses based on less than 10 years of data may give erroneous results. The method of E.J. Gumbel is utilized in this report. A short account of the method has been described by Kendall (1959).

4.2.2 *Data Adjustment Techniques and Analysis Error*

Various extrapolative or comparative techniques were used to develop the initial data set for the 1959 to 1978 period.

The Canadian Climate Centre has defined climate districts in Canada which are delineated by drainage basins, each district having similar physiographic characteristics and climate. A standard station is selected for each district, one with an observation record of good quality and 28 years or more in length, to serve as a basis for adjusting data for nearby stations.

Monthly values at short-period stations (at least five years of data), are paired with corresponding values for each standard station in the climate district. A simple correlation between paired stations is computed for significance. Then the paired station with the highest significant correlation is selected and the adjustment technique applied to compute a synthetic normal.

A "difference" adjustment technique is used for temperature. That is, the difference between the two concurrent temperature series is used as an additive factor to add to the normal of the standard station to estimate an adjusted normal for the given station.

The "ratio" adjustment is used for elements that do not have values less than zero such as precipitation, wind speed, sunshine and "days with". The ratio of the means of the two concurrent series is used as a multiplier. Complete details can be found in the AES (1982) publication of temperature normals.

Since only six stations in Yukon have over 30 years of record and 9 with 20 years of more, there are only 15 stations that have "standard" normals, the rest are adjusted. There are no long term stations in northern Yukon to use as standard stations so the adjustments in this sector are more susceptible to error than those in the south where paired stations are in the same climate region.

In Yukon, the variability of climatic parameters (as indicated by their standard deviations) is the highest on the continent. Two considerations lie at the root of this variation. One is the presence of the sharp baroclinic zone associated with the continental arctic front which can sweep back and forth across the region; the other is the rough terrain with its variable elevation, slope and aspect which can play havoc on a local scale with standard air mass characteristics through differential heating or cold air ponding, for example. All this lowers confidence in the placement of isolines on climatic maps for Yukon. This is most particularly true for monthly mean temperatures in winter and monthly mean precipitation in every season, for all of which standard deviations are high. Annual mean temperatures, having low standard deviations, are less variable and mapping is less susceptible to such uncertainty as a result.

The term "standard deviation" used here is a measure of absolute variation; that is, it measures the actual amount of variation present in a set of data. To put it another way, it is a measure of the dispersion or scatter of the data about the mean value (which is simply the arithmetic average of all the data points). If the standard deviation is large and the range of the variable over the area being mapped is small, i.e. a weak gradient, then the placement of a particular isoline becomes very uncertain.

In a normal frequency distribution represented by a bell shaped curve, two-thirds of the occurrences fall within one standard deviation either side of the mean. A small standard deviation is associated with a sharp peaked curve which in reality means the temperature (parameter) seldom strays from "normal". For example in a maritime environment such as at Estevan Point on the west coast of Vancouver Island, the standard deviation is 1.5°C or less in any month and 0.5°C for the year. On the other hand a large deviation is associated with a very flat bell shaped curve where values of the parameter far removed from the mean occur almost as frequently as the mean. In reality such a case means that "normal" is not too meaningful as hot or cold weather is almost as probable as the average (normal) weather. For example at Mayo where the temperature is the most variable in Canada the deviation is 6.9°C in January and 1.3°C for the year. In Yukon, in particular, values of daily temperature in winter (chapter 8), and precipitation (chapter 9), in any season have great variability from day-to-day, month-to-month or year-to-year and can be surprisingly different from normal.

The choice of divisions between isolines is important. If the isolines are to have predictive value the division between them should be at least twice the standard deviation. This criterion has not been followed rigorously in this study. The user is therefore advised not to consider the isolines to be fixed and precise. The patterns are for display purposes so the user should consider them as such and examine original data when solving detailed application problems.

TABLE 4.1

Approximate Number of Years Needed to Obtain a Stable Frequency Distribution (Annual and Monthly Values) (Landsberg, 1951)

Climatic Element	Islands	Shore	Plains	Mountains
	Extratropical Regions			
Temperature	10	15	15	25
Humidity	3	6	5	10
Cloudiness	4	4	8	12
Visibility	5	5	5	8
Precipitation Amounts	25	30	40	50

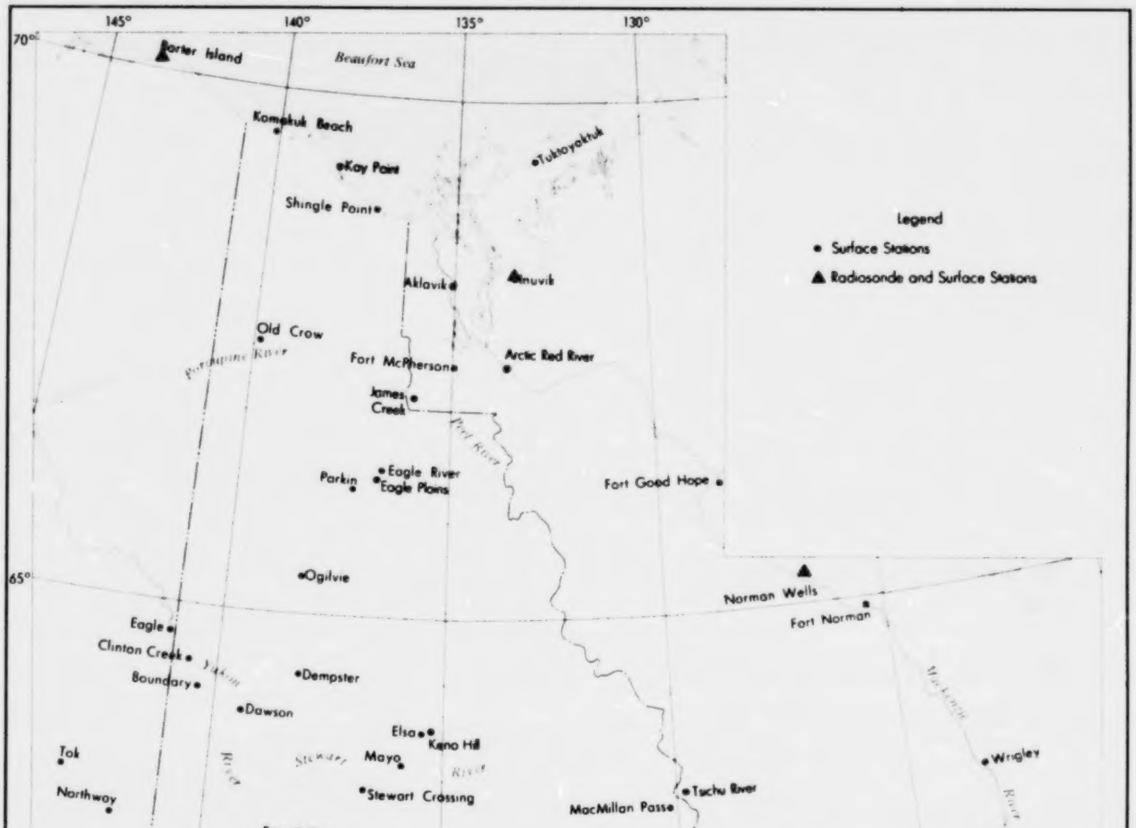

Legend
● Surface Stations
▲ Radiosonde and Surface Stations
Beaufort Sea
PACIFIC OCEAN
Barter Island
Komakuk Beach
Kay Point
Shingle Point
Tuktoyaktuk
Inuvik
Aklavik
Old Crow
Fort McPherson
Arctic Red River
James Creek
Parkin
Eagle River
Eagle Plains
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Keno Hill
Mayo
Tok
Northway
Stewart Crossing
MacMillan Pass
Tsichu River
Wrigley
Fort Selkirk
Beaver Creek
Snag
Sheldon Lake
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
Aishihik
Burwash
Frances Lake
Kluane
Quiet Lake
Tuchitua
Haines Junction
Divide
Logan
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Dezadeash
Dalton Post
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Bennett
Mile 75
Chilkoot Pass
Fraser
Atlin
Yakutat
Haines Apps. #2
Skagway
White Pass
Graham Inlet
Pleasant Camp
Mule Creek
Haines
Cassiar
Good Hope Lake
Muncho Lake
Summit
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
Ware
Kinaskan Lake
Angoon
Porcupine River
Peel River
Yukon River
Stewart River
Pelly River
South Nahanni River
Mackenzie River
Alsek River
Taku River
Stikine River
Liard River
70°
65°
60°
145°
140°
135°
130°
125°

Figure 4.1 Surface and radiosonde observational network

5. CLIMATIC SCALES AND CONTROLS

5.1 Scales of Climate

Climate can be divided into various scales. Macroclimate is a term describing features of atmospheric motion or phenomena affecting the whole northern hemisphere. The long wave ridge in the upper level westerly flow which is usually anchored over the Cordilleran region is in this category. It steers storms into the Gulf of Alaska and the major trough aloft upstream from the ridge is associated with the Aleutian low, a persistent climatic feature.

The synoptic scale is more often used in discussions of current weather rather than climate. It relates to a single major cyclone or anticyclone, normally about 1,000 km in diameter, which may affect all or only part of Yukon. A storm centre moving eastward over the Beaufort Sea will profoundly affect the weather on the Arctic slope but may have little or no perceptible impact south of the Ogilvie Mountains. This scale is defined by an observational network of stations 150 to 500 km apart. The synoptic climatology of Yukon is described in detail in chapter 12.

The mesoscale relates to that of a region such as a small drainage basin, an array of valleys, a plateau or a rough mountainous area, each of which experiences common climatic characteristics. The size of mesoclimatic regions is smaller in mountainous terrain than over a uniform prairie. An observational network of stations tens of kilometers apart is needed to detect such phenomena as, for example, the storm rainfall from a single cyclone. The variations in snow pack over a drainage basin may be due to mesoscale phenomena. The mesoclimate varies from one side of a mountain to the other.

Microclimate is the smallest scale. It relates to climate near the ground (Geiger 1965), ranging from a very local setting of a few square metres down to the environment experienced by a single plant or leaf. The microclimate in a forest clearing is much different from that under the canopy. Some climatologists consider climate near the ground in the vertical as microclimate and that in the horizontal as topoclimate.

5.2 Climatic Controls

The geographic or physical attributes that control climate are naturally occurring and usually fixed. They are latitude, the relief along with the surface characteristics of the land, the proximity of the region to large bodies of water, and the condition of the underlying surface. The last characteristic is particularly important in the control of local climate.

5.2.1 *Latitude and Radiation Effects*

Yukon lies between 60°N and 69°39'N latitude. This limits the amount of solar radiation received, some effects of which are discussed in the following paragraphs. Latitude partly determines the type and frequency of weather systems to which a region is exposed. Arctic high pressure areas frequent the latitude of Yukon in winter, the favoured location being over the central Yukon-Mackenzie Mountains area (Figure 7.1). Hurricanes or typhoons do not occur at these latitudes. Occasionally, however, a Pacific storm spawned from a typhoon moves into the Gulf of Alaska where there is a high frequency of occurrence of cyclones, particularly in fall and winter. The synoptic climatology of weather systems that impact on Yukon climate is discussed in detail in chapter 12.

Solar energy drives atmospheric motion. Its cyclic nature creates our seasons; it essentially creates snowmelt and evaporation; and is one if not the most important factor in growth of vegetation and human comfort. It varies with altitude and latitude.

The seasonal variability in possible hours of daylight with latitude is shown in Figure 5.1. The possible hours of daylight on the fifteenth of each month and the minimum for the month for selected latitudes along the 135th meridian are given in Table 5.1. At latitude 60°N the hours of daylight vary from a minimum of under 6 hrs on December 21 to a maximum of nearly 19 hrs on June 21. Beyond the Arctic Circle the number of days of continuous sun or no sun increases northward; at Herschel Island the sun is up from May 20 to July 23 but doesn't rise from December 1 to January 3.

The amount of solar (short-wave) radiation received on a horizontal surface decreases northward due to the lowering angle of incidence of solar energy. The variation in solar altitude at various times of the year for selected latitudes is given in Table 5.2.

Part of the short-wave radiation is absorbed, and some is reflected by the atmosphere and clouds; some is scattered by particles in the air into diffuse sky radiation; and the remainder reaches the earth. The total incoming direct and diffuse short-wave solar radiation received from the dome of the sky is defined as global solar radiation. This is shown in Figure 5.2 for Whitehorse and also at Edmonton, for comparative purposes. Global radiation generally increases southward. Southern Canada receives about 70%, while Yukon receives a little less than 50% as much as Arizona mainly due to the difference in latitude. The mean daily global solar radiation at Whitehorse in June is 21.04 MJm^{-2} – not much less than the 21.87 MJm^{-2} received at Edmonton, because of the longer summer days in Yukon.

At the surface of the earth some short-wave radiation is absorbed and some is reflected back to the atmosphere and space. The ratio of reflected energy to the total received is the "albedo", which varies greatly with the characteristics of the surface. Fresh clean snow has an albedo of 0.8 or higher – 80% of the solar energy is reflected leaving only 20% absorbed by the snow. Skier's sunburn is mainly due to the high albedo of the snow surface. It can be seen from Figure 5.2 that there is a sharp increase in available solar energy from March to May. However, air temperatures over snow covered northern latitudes do not rise very rapidly in this period while snow remains on the ground.

The earth, clouds, and the atmosphere especially if moist, absorb and emit long-wave radiation, the amount of which varies with their respective temperatures. Cloudy skies and moist air will act as a blanket to retard the rate of cooling at the surface. On the other hand, on clear calm nights, with a dry atmosphere, little of the radiation lost at the earth's surface is returned so the surface layer of air cools quickly. Many factors affect the balance of incoming versus outgoing radiation.

Net radiation is the resultant of downward and upward total (solar, terrestrial, and atmospheric) radiation received on a horizontal surface. The daily values on a monthly basis for Whitehorse and Edmonton are shown in Figure 5.2. The net radiation is negative at Whitehorse for six months, October to March inclusive, while at Edmonton the deficit lasts four months, November to February. It is noted that although Edmonton receives more global solar radiation than Whitehorse in December and January it has a greater deficit in net radiation in this period. This is partly due to greater cloudiness at Whitehorse in these months.

Topography affects radiation, as it can increase or decrease the amount received in a given location. The amount received on a given surface depends on its slope and aspect. A south facing slope receives more than one facing north, while east facing slopes receive more before noon that those facing west; the solar radiation is a maximum for slopes facing the sun when and if the rays are perpendicular to the slope. Geiger (1965, cited by Janz and Storr, 1977), in his discussion of slope climate, stated that in Germany a slope of 20° facing south received roughly twice as much radiation as a horizontal surface.

Shadow effects due to mountains are of course greater the deeper and more sheltered the valley. A sudden change in radiation at sunrise or sunset due to shading will significantly affect human comfort.

5.2.2 *Effects of Topography*

The topography of a region has a strong influence on its climate and Yukon is a rugged region with wide ranges in elevation. The relief of the mountains, their orientation and location effectively block airflow at lower levels from the Pacific, and to a lesser degree from the Arctic Ocean. By limiting the entry of moisture the topography establishes a continental climate (section 6.1) in Yukon.

In any part of the Cordilleran region the changes in climate with elevation can overshadow those changes due to most other controls. Almost every climate element is affected by elevation. Atmospheric pressure decreases with elevation; temperature generally decreases with elevation except that when inversion conditions are present, it increases with elevation. Most other elements generally increase with elevation. These include the amount and frequency of precipitation, wind speed, frequency of summer frost, frequency of precipitation in solid form (snow, hail, graupel), frequency of cloud cover, frequency of lightning. Severity of wind chill and avalanche hazard is weather-elevation dependent (Janz and Storr, 1977).

The immense St. Elias Mountains and other ranges such as the Coast Mountains and the Alaskan Range (Figures A and B) are a physical barrier to storms trying to move inland from the Gulf of Alaska. Storms spiral to a halt in this area partly because of the formidable topography they encounter on the coast. If the coastal mountains were absent, the maritime climate of the Pacific coast would extend over Yukon, except precipitation would be less due to the absence of orographic effects.

On the other hand, the Mackenzie-Richardson-British mountain block can, at times, hold the Arctic air mass to the north and east of Yukon. This gives some respite from the uninterrupted cold often encountered in the Mackenzie District. Once the cold air is entrenched in Yukon, however, it is extremely difficult to expel because it becomes trapped in deep valleys with no easy means of escape, although brisk winds can usually erode the cold air from the plateaux.

Topography has an important effect on wind flow. The essentially smooth surface of the Yukon coastal plain and the higher winds offshore, due to less friction over the sea, promote strong winds often parallel to the coast, making this area one of the windiest in Yukon (chapter 7).

Seabreeze, katabatic (downslope), anabatic (upslope), channeling, and funneling conditions are mainly due to topography, all of which can cause local winds significantly different in both speed and direction than those due to the regional pressure gradient (chapter 7).

The temperature normally decreases with height above ground but this is reversed in the lower levels in winter when inversion conditions prevail. Thus localities at higher elevations, but within the inversion, can be warmer than valley bottom locations; their daily range of temperature and that of extremes is less; winters are somewhat milder, but summers are cooler than at lower elevations (chapter 8).

Mountain barriers or even small hills can enhance precipitation due to orographic lifting on the windward slopes or suppress precipitation on the leeward side due to subsiding winds. For example, heavy precipitation occurs on the coastal side of the St. Elias-Coast Mountains with much less on the leeward interior slopes and valleys.

Waves can occur in airflow traversing hills or mountains. Depending on how these waves phase with the relief, wave amplitude is increased or decreased (Figure 5.3). An increase causes greater uplift, enhancing cloud cover upwind from the ridge line, while strong subsidence east of the ridge clears cloud. Varying degrees of turbulence can occur due to such waves and local or regional cloud and precipitation regimes can be affected. The change in precipitation patterns due to topography can be very complex. Any model that suggests a simple one to one relationship can at times be grossly in error; this will be discussed further in chapter 9.

5.2.3 *Proximity of the Oceans*

The proximity of the Pacific and Arctic Oceans, being moisture and heat sources or sinks, establishes control mainly on temperature and precipitation climate in Yukon. The distribution of land and water has considerable impact on the regime of these two parameters.

Large masses of open water react more slowly than does the atmosphere or continents to diurnal/seasonal temperature changes. The modification of an air mass traversing a water body is dependent on the length of time it is in contact with the water and the initial temperature difference between the two.

Large bodies of water are generally precipitation sources when the air is colder than the water. In such conditions moisture from evaporation is spread through a deep layer by convection. On the other hand, water bodies colder than the overlying air are precipitation depressants as the net moisture flux is generally downward. It is partly for this reason that in spite of widespread puddling on ice in summer and "wet" permafrost, polar and subpolar climates are arid.

The Gulf of Alaska is a major source region for airflow into Yukon. Although somewhat modified by cold waters from the western Bering Sea, the Alaska Current is a relatively warm corridor along the north Gulf Coast. This is shown by sea-surface isotherms (Figure 5.4). These waters remain ice-free year-round except for some temporary ice in protected fiords or estuaries during very cold winter outbreaks.

Air masses over the Gulf are 10 to 15°C colder in winter than in summer. Continental values at this latitude, however, show considerably more seasonal variation, being 40 to 60°C colder in winter. Therefore, air moving into Yukon from the Gulf during winter results in significant warming while in summer this flow results in cooling.

The Arctic Ocean and Beaufort Sea, on the other hand, do not cause major modifications to the overlying air mass, which is essentially always Arctic in origin. They are ice-covered year-round with the exception of some open water beginning in the Mackenzie Delta in early June which slowly extends along the Yukon coast to the Alaskan border by August and a second, narrow lead along the Alaskan coast which starts in late July. Water temperatures in August for offshore are shown in Figure 5.4. Freeze-up of these leads begins in September. There is some heat conducted through the ice (both winter and summer) but it merely prevents the winter temperature from reaching the extremes that occur on land. Ice fog and arctic sea smoke form near open leads in winter while in summer and fall, low cloud is common and large areas of advection fog can occur, usually near ice-water boundaries.

5.2.4 *Effects of the Underlying Surface*

Air masses moving northward from mid-latitudes are warm and relatively moist. They can receive some shallow cooling and stabilization by the cooler Gulf waters, which often creates extensive low cloud and fog. Colder air masses moving out of Siberia or western Alaska in winter with a trajectory over the north Pacific continue to warm in the lower layers, absorb moisture, and become increasingly unstable, creating extensive cumulus type cloud.

The network of large lakes in northwestern B.C. and southwestern Yukon does have considerable local effect on climate, especially in the fall. In northern Yukon, lakes and rivers are ice-covered from mid-October to June, while in the south only from November to early May. Maximum water temperatures in summer reach a peak of 12 to 15°C in August. Some of the larger lakes in the southwest do not freeze over until late December, occasionally early January. More complete details on freeze-up and break-up can be found in AES (1977).

In the spring, appreciable cooling can be identified up to 4 km from the large lakes where the leafing out of trees can be delayed up to two weeks. The most significant effect occurs in late summer and fall. Strong night-time cooling can result in heavy frost, but it also favors the development of fog near warm water which acts as a protective blanket and inhibits the occurrence of frost. In the early winter the larger open lakes can choke the valleys with fog and low cloud for prolonged periods of time up to early January. Temperatures are more moderate under this cloud and occasionally light snow may occur.

The effect of a water surface differs from a frozen one; other changes occur as the ice surface becomes snow covered. Land masses react relatively quickly to radiative energy. The way they react depends on such factors as the type of vegetative cover, texture, water content, and colour. Albedo, defined in section 5.1, is a measure of the reflectivity of various surfaces; typical values are given in Table 5.3.

The reflection of solar radiation from tundra varies from about 25% in early summer to about 80% when it is covered with fresh snow. Differences in absorption of solar radiation, energy emission, slope and aspect, heat capacities and conduction, and in local energy transfer mechanisms create meso- and microclimates which are biologically very important. For example, small groups of conifers act as heat islands on a sunny afternoon as do areas void of snow when located within an extensive snow field (Findlay and Treidl, 1977).

Adjacent areas with contrasting surface cover and roughness may have sharply contrasting moisture and energy balances. Rugged terrain resists airflow more than a smooth surface, thus winds over the sea are greater than on the coast, and winds inland on the tundra are stronger than over forested areas. Winds are discussed in detail in chapter 7.

TABLE 5.1

Possible Hours of Daylight on the 15th of the Month & Minimum Each Month (h + min)

Latitude		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
70 N	Min	0	04 59	09 33	14 04	18 58	24	21 30	15 36	11 15	6 34	0	0
	Mid	0	07 23	11 36	16 12	22 52	24	24	18 12	13 23	9 04	3 48	0
65 N	Min	3 55	6 54	10 07	13 37	17 06	20 42	18 22	14 47	11 25	7 55	4 42	3 35
	Mid	5 04	8 30	11 42	15 13	18 45	21 54	20 13	16 37	13 05	9 44	6 14	3 41
60 N	Min	6 03	8 01	10 29	13 19	16 00	18 18	16 54	14 14	11 32	8 47	6 31	5 52
	Mid	6 44	9 13	11 46	14 35	17 10	18 49	18 03	15 39	12 53	10 12	7 32	5 56

TABLE 5.2

Maximum and Minimum Daily Solar Elevation (Degrees)

Latitude	Winter Solstice Dec. 22		Spring & Fall Equinoxes Mar. 21, Sept. 23		Summer Solstice June 22	
	Max.	Min.	Max.	Min.	Max.	Min.
80 N	0	0	10	0	33	13
70 N	0	0	20	0	44	4
65 N	1.5	0	25	0	49	0
60 N	6	0	30	0	54	0
45 N	21	0	45	0	69	0

TABLE 5.3

Albedo Values over Various Surfaces

STRUCTURE	WATER CONTENT AND COLOUR, MISCELLANEOUS CHARACTERISTICS	ALBEDO %		
		AVE.	MAX.	MIN.
Freshly fallen snow	dry, bright-white, clean	88	98	72
	wet, bright-white	80	85	75
Freshly drifted snow	dry, clean, loosely packed	85	96	70
	moist, grey-white	77	81	59
Snow, fallen or drifted 2-5 days ago	dry, clean	80	86	75
	moist, grey-white	75	80	66
Dense snow	dry, clean	77	80	66
	wet, grey-white	70	75	61
Snow and ice	dry, grey-white	65	70	58
Melting ice	wet-grey	60	70	40
	moist, dirty grey	55	65	36
Snow saturated with water (snow during intense thawing)	light green	35	–	28
Melt puddles in first period of thawing	light blue water	27	36	24
Melt puddles, 30-100 cm deep	green water	20	26	13
	blue water	22	28	18
Melt puddles covered with ice	smooth, grey-green ice	25	30	18
	smooth ice, covered with icy, white hoar frost	33	37	21
Water	(47°	4	–	–
	Solar (43°	6	–	–
	Elevation (20°	14	–	–
	(12°	30	–	–
	(5°	65	–	–
Soil	dark	10	15	5
	moist, grey	15	20	10
	dry sand	35	45	25
Grass	dry	23	30	15
	wet	28	35	20
Forest	green	7	10	3
	deciduous	18	–	–
	snow-covered ground	18	25	10
Cloud	overcast cumuliform	80	90	70
	stratus	70	84	59
	altostratus	49	54	39
	cirrostratus	47	50	44

Source: Maxwell (1980).

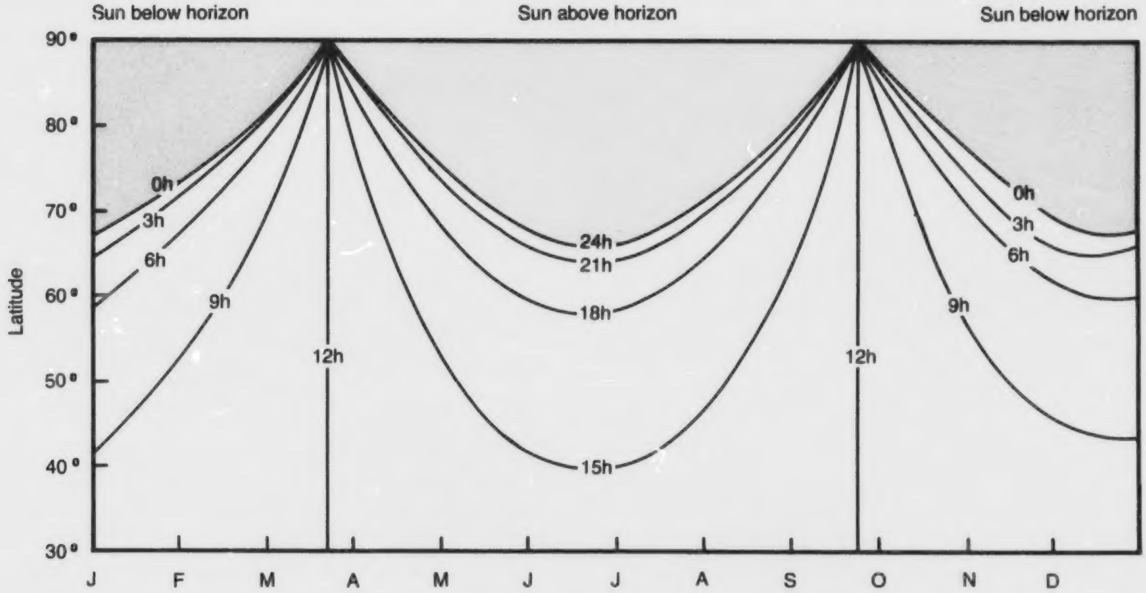


Figure 5.1 Duration of daylight

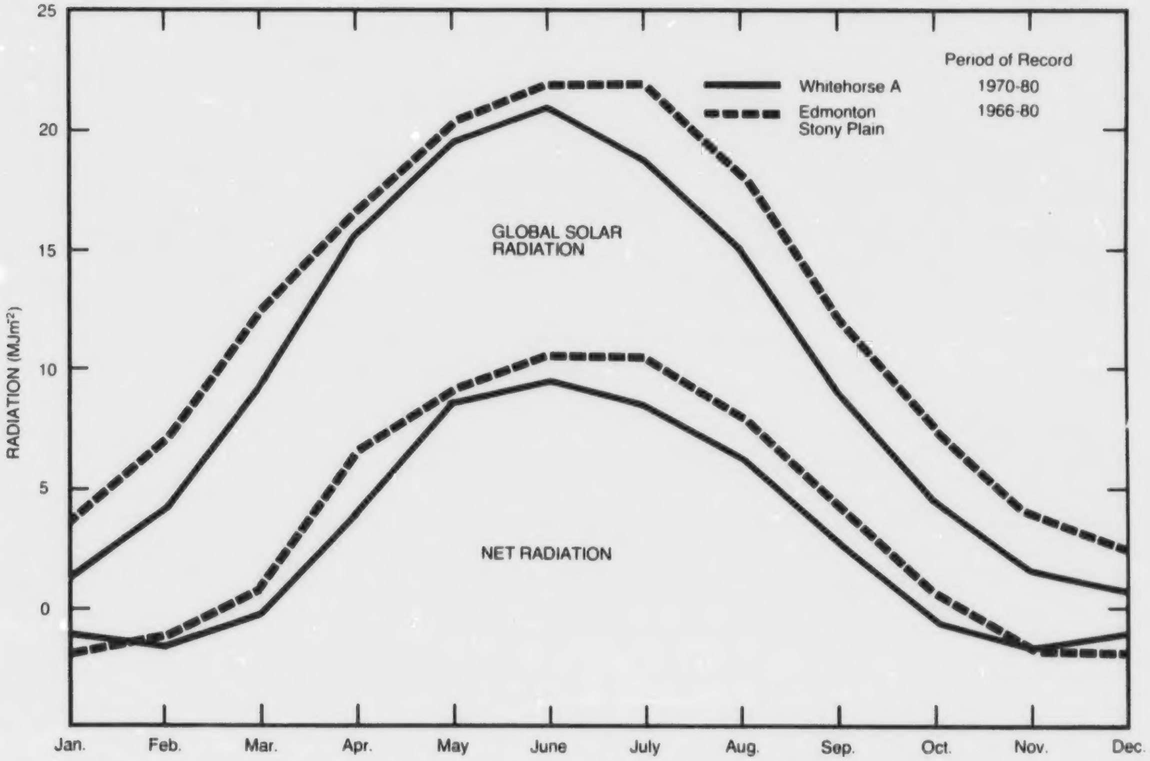


Figure 5.2 Mean daily radiation values observed at Whitehorse and Edmonton Stony Plain

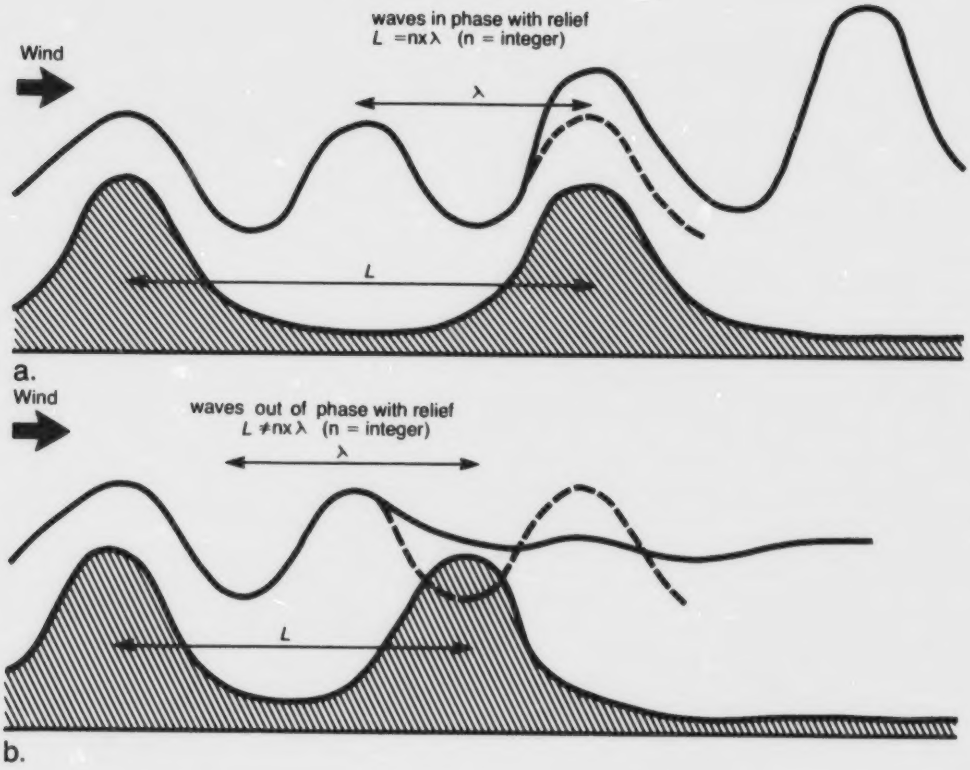

waves in phase with relief
$L = n \times \lambda$ (n = integer)
Wind
λ
L
a.
Wind
waves out of phase with relief
$L \neq n \times \lambda$ (n = integer)
λ
L
b.

Figure 5.3 Modification of airflow by successive mountain ranges (Queney *et al.*, 1960)

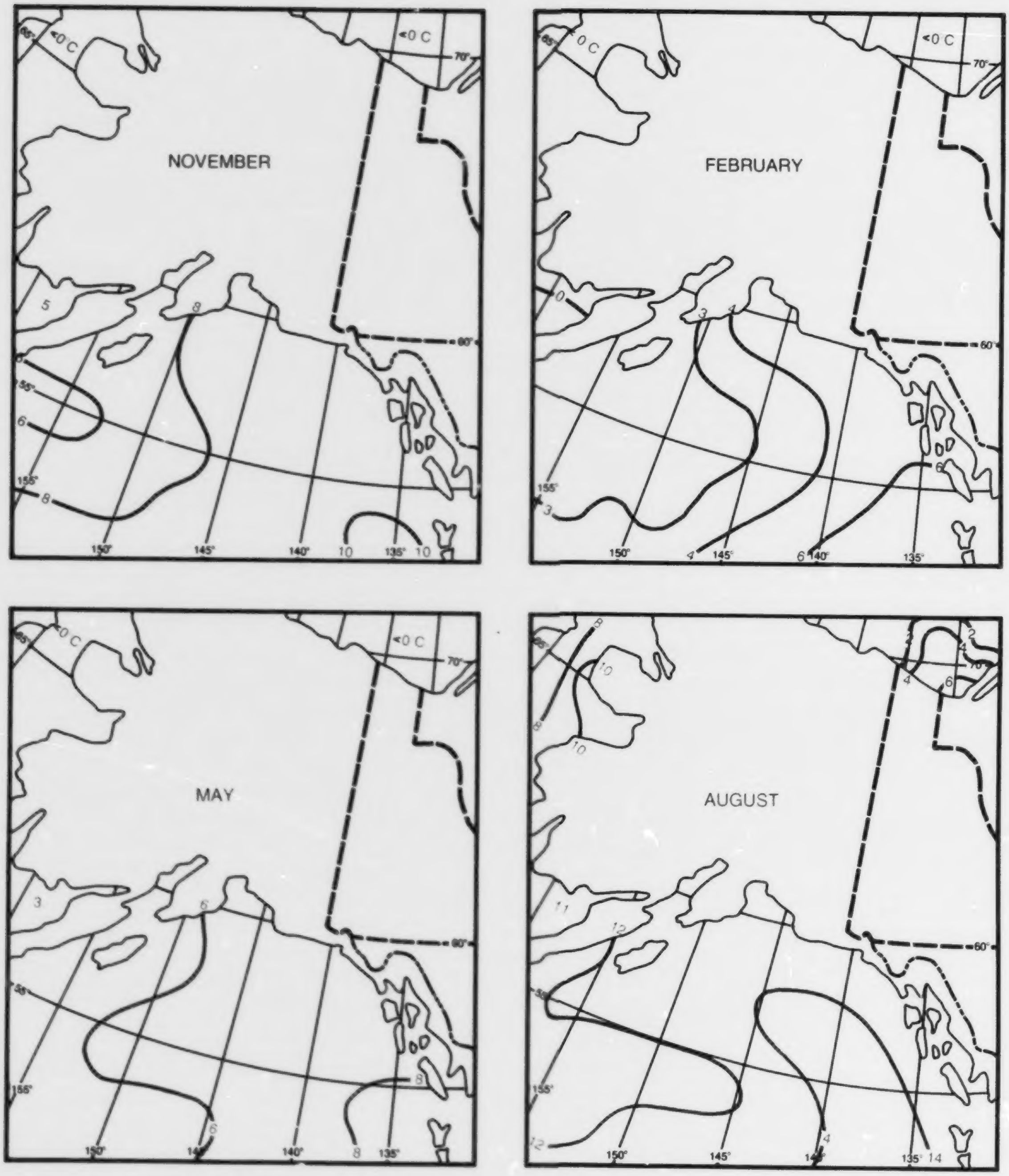

NOVEMBER
FEBRUARY
MAY
AUGUST
<0 C
70°
60°
65°
55°
155°
150°
145°
140°
135°
5
6
8
10
3
4
12
14

Figure 5.4 Sea-surface temperatures (°C) for selected months for waters adjacent to Yukon (Searby and Hunter, 1971)

6. CLIMATE REGIME

6.1 General Climate

According to Hare and Thomas (1974), all but a small part of northeastern Yukon is in the Cordilleran climatic region (Figure 6.1). Sub-divisions according to Kendrew and Kerr (1955), (Figure 6.2), are on a smaller scale, closer to the synoptic rather than macroscale. The concern of the authors of this report is with all scales down to and including the mesoscale and Yukon has been sub-divided into nine climatic regions, depicted in Figure 6.3. There are certain detectable long-term climatic differences from one region to the other. The division simplifies the descriptive exercise, but the quantitative differences in some cases can not be rigorously defined due to meager data.

Yukon climate in the broadest sense is sub-arctic continental. Criteria for continental climate are large annual, day-to-day, and daily ranges in temperature, low to moderate atmospheric moisture content, and moderate or light and irregular precipitation. The classification of sub-arctic rather than arctic is used to recognize that although severe cold spells can develop, storm tracks and the proximity of the Pacific result in frequent intrusions of mild air in winter.

Extreme temperatures in Yukon have ranged from 36.1 to -62.8°C, a range of 98.9°, about twice that for Vancouver, BC. The extreme maximum occurred at Mayo and the minimum at Snag, although Mayo is second with -62.2°C. Both stations are in the Central-Yukon Basin region (Figure 6.3). These extremes occurred on valley floors below 600m. The range of temperature, both daily and annual, decreases significantly with elevation. Elsa, at 814m, has experienced extremes of only 33.9 to -51.7°C over 15 years of record. Anvil, at 1158m shows even less range, from 29.4 to -46.1°C over 10 years of observations. The continental nature of the climate appears to diminish with elevation.

Wide daily ranges in temperature occur, with mid-summer frosts and mid-winter thaws being relatively common. Watson Lake is the only station that has never recorded a frost in July. Most areas have a frost-free period of 40 to 60 days with areas in southern and central Yukon experiencing as many as 70 to 95 days without frost.

Whitehorse, on the average, has 224 days with frost, a few less than Yellowknife. To the south, for example, Prince George has 195 and Edmonton 185 days with frost. Mid-winter thaws occur at all stations below 2000m but are most common below 1500m in southwestern Yukon. On the average, valley stations in the south have 2-4 days in January with above freezing temperatures.

The mean annual temperature is below zero in all areas, ranging from near zero over the south to about -10°C in the far north and at higher elevations. Mean annual temperatures over the interior are similar to those at the same latitude in the Mackenzie River basin. Those in the southwest Yukon are a few degrees higher because of more frequent mild spells in winter. July is the warmest month with a mean near 16°C at the lower interior stations yet still below zero above the 3000m level. January is the coldest month except along the Arctic coast where the coldest weather occurs in February. Mean January temperatures range from near -20°C at Whitehorse to -29°C at Mayo, in central Yukon, down to -33°C in the Old Crow area. At Anvil, in central Yukon near Faro but 467m higher in elevation, the January mean is -20°C, the same as at Whitehorse to the south. This demonstrates the effectiveness of the winter inversion in creating moderate temperatures at higher elevations.

Precipitation throughout the Territory varies significantly from south to north, and with elevation. There is a marked rain shadow northeast of the St. Elias-Coast Mountains. On the windward coastal slopes, however, total annual precipitation ranges from 1000mm to near 4000mm. Over the interior Yukon annual totals are near 200mm on the Arctic slope to 700mm in the higher country on the south slopes of the Mackenzie Mountains. Western and southern slopes of the major mountain barriers receive the most precipitation, while the north and east faces are generally very arid. The abrupt change from a maritime to continental precipitation regime to the lee of the coastal range is common to the entire Cordilleran region. Walker (1961) reported that an annual total of about 750mm over the Coast

Mountains in southern British Columbia becomes less than 100mm just east of this range. Whitehorse receives a little more annual precipitation than Kamloops, British Columbia, and slightly less than Yellowknife. Watson Lake, receives substantially more, about the same as Calgary and Lethbridge in Alberta.

Generally the summer season receives the greatest precipitation from instability cloud and cold lows. In southern Yukon, especially the southeast, the period of heaviest precipitation extends into October and November, mainly due to fall cyclonic activity in the Gulf of Alaska and cyclogenesis in the lee of the Rocky Mountains around the Ft. Nelson area. About 60% of precipitation at low levels is in the form of rain. Of course this percentage decreases with elevation until above 2500m almost all is in the form of snow. Mid-May to early October is the dominant season for liquid precipitation. Snow has occurred at all stations in every month but July. Rain occurs in all months but is very uncommon January to March inclusive.

The snow line is generally at its maximum height from mid-July to mid-August and has reached the 2000 to 2500m level. Snowfalls may occur at all elevations by late August but only remains permanently above the 1500m level. By mid to late September the snow line has normally lowered to the 1000 to 1200m level except there may be total cover over the Ogilvie-Mackenzie Mountains and northward. Total snow cover on the lower valleys of southern Yukon does not usually occur until the last week in October.

Snow depths reach their maximum by early to mid-March, except early to mid-April north of the Ogilvie Mountains and at elevations above 1000m in southern Yukon. Depths on the valley floors in the southwest range from 30 to 50cm increasing to 50cm in central and northern regions. Along the Arctic coast, however, accumulation is from 20 to 30cm. The Liard Valley receives 60 to 70cm. The snow pack reaches 90cm over the higher Cassiar and southern Mackenzie Mountains by mid-April. Limited data indicate accumulations of 300 to 500cm occur in the St. Elias range. By early May the snow melts in the lower valleys in the south. It recedes to the 1000m level by mid-May throughout southern and central Yukon. Snow cover lingers, even on the valley floors, in northern Yukon until late May or early June.

Winds are influenced considerably by local topography but the strongest prevailing winds occur over southwestern Yukon and along the Arctic coast. Komakuk Beach and Shingle Point have annual averages of 20.1 and 18.6km/hr, respectively, while those at Burwash and Whitehorse are 12.1 and 14.1km/hr. Less wind occurs in central Yukon. At Dawson and Mayo, for example, mean annual speeds are only 6.5 and 5.8km/hr. Wind direction is almost always controlled by the topography rather than the general pressure gradient. Average monthly speeds show no major seasonal bias but extreme winds, associated with major pressure systems, usually occur in fall or winter. Winds of destructive force have been reported in many districts in Yukon. They are most common in the southwest and on the Arctic coast. Burwash has reported southerly gusts to 171km/hr while it is estimated that Shingle Point has had westerly gusts over 150 km/hr.

6.2 Climate Variability

There is a distinct paucity of long-term data from Yukon. The complex effects of elevation and aspect on meteorological parameters; the large differences in the air masses that invade Yukon; and many other factors lead to great variability. The question of how meaningful the real and derived data are to the user is one which naturally arises. Quite simply, the user, as with all climatological information, should use the data with caution and recognize that the variability of climatological parameters in Yukon is the greatest in Canada. Using temperature as an example, Mayo shows a February temperature range of more than 74°C from 12.2°C to -62.2°C and a July total precipitation range from 9.1mm to 107.7mm.

However, a more meaningful appraisal of the variability of a parameter can be obtained by examining the standard deviation rather than the extremes, such as in Table 6.2 for temperature. This statistical approach compares the occurred value with the average of all values. In general, two-thirds of the occurrences of a parameter will lie within one standard deviation of the mean. Of course, the larger the standard deviation the greater the variability (section 8.5).

Kendall and Anderson (1966) produced temperature standard deviation charts for Canada. The large values over Yukon in comparison with the rest of Canada are readily apparent in Figure 6.4. In addition, areal variations for a single parameter are often extremely great. See, for example, the precipitation distributions in Figures 9.3 to 9.15.

6.3 Climatic Divisions

Regionalization of climate resulting from a combination of the effects of latitude, topography, elevation, scales of atmospheric motion, etc. leads quite naturally to the delineation of climatic zones – areas within which the climate exhibits relatively uniform characteristics. Yukon has, on this basis, been divided into nine climatic regions which reflect the various sub-climates of the territory. The major control is topography and associated elevation. Although some of the interior divisions are often referred to as uplands or plateaux because of their average elevation, the term basin is used here to emphasize the general topographical shape and because the majority of settlements are in valley bottoms.

A description of the climatic characteristics of these regions, depicted in Figure 6.3, follows. It must be remembered that climate is a continuous variable so there is a gradual change across the regional boundaries. Some local discontinuities do occur, however, due to orographic affects along sharp ridges. Also boundaries of climatic regions do cross political boundaries. Climatological stations are listed by region in Table 6.2. Climatic characteristics of selected representative stations are given in Table 6.3.

6.3.1 *The St. Elias-Coast Mountains*

This region consists of the first major orographic barrier between the Pacific Ocean and the interior of the continent. The effective elevation ranges from 2000 to 2500m in the Coast Mountains of northwestern British Columbia and south-central Yukon to 3000 to 4000m elevation in the St. Elias Mountains of southwestern Yukon. It is a very effective block to the intrusion of moist maritime air into Yukon and British Columbia.

The climate of the St. Elias-Coast Mountain zone is strongly transitional ranging from a wet maritime climate on the windward coastal side to a dry continental climate northeast of the barrier. Annual total precipitation amounts decrease from up to 4000mm on the coast side to under 300mm in the Shakwak Valley (Figure 3.1, interior system) on the continental side. Taylor-Barge (1969) defined a climatic divide, or zone of transition, separating maritime and continental characteristics in the vicinity of the topographic divide of the St. Elias Mountains and generally 160km inland from the coast. Solid precipitation is the norm above 3000m. At the lowest elevations, precipitation is commonly in liquid form from mid-May to September, inclusive. The major snow accumulation zone lies between 1500 and 3000m. The copious supply of moisture is mainly responsible for the extensive network of glaciers in the Icefield Ranges, within the St. Elias Mountains. These ice areas exceed that of any other glacier system outside the polar regions. Marcus and Ragle (1970) found that equilibrium line elevations (where winter glacier nourishment is balanced by warm season ablation) average approximately 2100m on the continental side and 1100m on the marine slope. Valley glaciers extend downslope from accumulation zones to the 900 to 1200m level.

The temperature field is complex due to the proximity of the Pacific and the extreme range in elevation of the mountain barrier. On an annual basis the mean temperature ranges from near zero on the marine side to -5°C on the northeast side of the transition zone. Within the St. Elias Mountains, however, mean annual temperatures above the 2500m level fall to the -10 to -15°C range. The boreal forest gives way to low bushes and tundra at about the 1200m level. Alpine pastures above the tree line provide feeding grounds for Dall sheep, goats, caribou and grizzly bears.

Due to the storminess of the Gulf of Alaska, this region is one of the windiest in Yukon. The complex terrain distorts the wind pattern. Valleys cause funneling and channeling effects. Glaciers create katabatic (downslope) winds. During severe winter cold spells when the Yukon interior is experiencing -50° to -60°C and calm winds, the coastal valleys may be subject to strong outflow winds resulting in fierce local blizzard conditions with temperatures -20 to -40°C driven by winds in excess of 100km/hr.

Representative stations are Mule Creek and Pleasant Camp in northern British Columbia. The climate within Kluane National Park has been studied in some detail by Webber (1974).

6.3.2 *The Upper Yukon-Stikine Basin*

This region is a relatively high elevation plateau lying between the St. Elias-Coast Mountains and the Cassiar-Pelly Mountains. The plateau is, however, indented by deep river valleys with a general elevation of 600 to 1200m and has disorganized mountains with elevations up to 2000m. The most significant climatological feature of the region is low precipitation, a result of the rain shadow effect of the St. Elias-Coast Mountain barrier.

Most of the region receives less than 300mm of precipitation annually and many valley localities receive only slightly more than 200mm. The most arid areas appear to be in the vicinity of Carcross, and Kluane Lake.

The temperature regime is typically continental showing a great deal of variability on a daily as well as seasonal basis. The high elevation of even the valley floors does, however, result in less extreme values of both maximum and minimum temperatures as compared to the lower central Yukon, Liard and Porcupine-Peel basins. Proximity to the Pacific often results in more frequent mid-winter mild spells than occur elsewhere in Yukon.

This zone has the third highest average hourly wind speed after the St. Elias Mountains and the Arctic Slope region. Whitehorse is the most consistently windy location but Aishihik has the highest extreme, 57km/hr, in December. Speeds can reach destructive force fairly frequently and Burwash has recorded the peak gust. It should be recognized that valleys with northwest-southeast orientation are the windiest, as indicated by Whitehorse. Haines Junction is not in such a location and winds there are quite light.

Representative stations are Burwash, Whitehorse, Carcross, Teslin and Dease Lake.

6.3.3 *The Pelly-Cassiar Mountains*

Extending from northern British Columbia into the south-central Yukon, these mountains form a relatively continuous orographic barrier with elevations of 1000 to 2000m with occasional peaks to 2500m. The Pacific-Arctic divide meanders through these mountains. Swift River, near the divide receives 582mm of precipitation annually. Totals are relatively high, ranging from 500 to 700mm, with the heaviest occurring in fall and early winter. An active storm track traverses the region in this period. The higher elevations result in less severe winter temperatures and frequent mid-winter mild spells. Summers are, however, relatively cool. Although there is an active storm track through the region, pressure patterns are disorganized, which results in relatively light winds.

Representative stations are Quiet Lake, Swift River and Cassiar.

6.3.4 *Central Yukon Basin*

This region is a northward extension of the Yukon-Stikine Basin, but its average elevation is lower. Also its greater distance from the effects of the Gulf of Alaska and the St. Elias block has given the Central Yukon Basin rather different climatological characteristics than its southern neighbour.

Precipitation is relatively moderate, 300 to 400mm, most falling in summer showers. Temperatures are more variable and extreme with warm summers, yet prolonged sometimes severe cold spells in winter. Snag with the North American record minimum temperature of -62.8°C is in this zone. Mayo and Ross River have been almost as cold. Mayo holds the record of 36.1°C for the extreme maximum in Yukon. Well-organized storm centres commonly skirt this zone especially in winter when anticyclonic circulation dominates the interior. Winds tend to be light with a high percentage of calm conditions in winter.

Representative stations are Dawson, Mayo, and Ft. Selkirk. Ross River is not typical due to very low precipitation, a local rain shadow effect of the St. Cyr Range in the Pelly Mountains.

6.3.5 *The Ogilvie-Mackenzie Mountains*

This zone consists of the massive Mackenzie Mountain block and the westward extension to the lower and narrower Ogilvie Mountains. Elevations range from 2500 to 3000m in the Mackenzies to 1500 to 2200m in the Ogilvies. The topography is chaotic and frequently abrupt resulting in very complex variations. Precipitation is moderate to heavy, with highest values along the major southwest slopes, ranging from over 700mm annually in the southeast to the 400 to 500mm range in the Ogilvies. Due to elevation and the winter inversion, winters are relatively moderate. Summers are cool. Mid-winter intrusions of mild air are not as frequent as in the Pelly-Cassiar Mountains. Winds are generally light; however, the rough terrain can cause some local strong wind effects.

Representative stations are Klondike, Tsichu River and Tungsten. The climate of Nahanni National Park has been studied by Crowe *et al.* (1979).

6.3.6 *Liard Basin*

The broad valley of the Liard River is relatively flat with elevations between 700 and 1000m. Precipitation is moderate, between 400 and 600mm annually. There are more days with precipitation in this zone than elsewhere in the interior of Yukon and a substantial amount is in solid form. At Watson Lake the total in the three summer months is about the same percentage of the annual amount as that in the five winter months. At higher elevations to the north, for example at Tuchitua, the winter precipitation as a percentage of the annual total is significantly higher than that for summer. Summers are warm. Arctic air can remain entrenched for long periods in the Liard Valley to cause protracted cold spells. Winds are moderate.

Representative stations are Tuchitua and Watson Lake.

6.3.7 *Porcupine-Peel Basin*

This basin is a combination of plains and plateaux bordered by the Ogilvie-Wernecke Mountains on the south, with the Richardson and British Mountains to the east and north. There are, however, some significant openings on the boundary. In the west is the valley of the Porcupine River; the Blow River exits between the northern mountain ranges; and in the southeast, the Peel Plateau extends eastward into the Mackenzie Valley. The central area is quite flat, particularly the Old Crow Flats, with elevations near 300m.

The climate in this basin is quite different from any of the southern zones. The winters are prolonged and cold, particularly on the valley floors, lasting from mid-October to well into May. However, inversion effects can create milder temperatures at higher elevations. Winter storms from the Gulf of Alaska or along the Arctic coast are generally weak when they reach this zone. As a result, associated winds fail to erode the cold air from the valleys but can bring mild air to the plateaux. Summers are short and variable although some days can be as warm as those much further south. Modified Arctic air frequently invades the area in summer resulting in sudden changes to cool blustery weather. The Ogilvie Mountains act as an effective barrier to moisture from the Pacific. As a result, the precipitation is light, with annual amounts in the 200 to 300mm range. Most of the precipitation is from summer convective activity, but occasionally well-developed rainstorms pass through (Figure 9.29). Winds are light with a high percentage of calm conditions in winter.

A representative station of the central basin is Old Crow. Parkin and Eagle Plains are indicators of the foothill-plateau country.

6.3.8 *Northern Mountains*

The Richardson and British Mountains, although reaching 1200 to 1600m are low compared to the high terrain of southern Yukon. They are, nevertheless, formidable to the immediate surrounding area. While little climatological data are available within the zone, some estimates have been made.

Orographic effects enhance precipitation, but the airmasses have a low moisture content. Annual precipitation amounts are estimated to be between 300 and 400mm most of which should occur in summer. Winter temperatures should be milder than in the surrounding lowlands due to inversion effects. The higher terrain is treeless so snow accumulation would be low in areas exposed to prevailing winds, which is of some benefit to wintering caribou. Cool changeable weather occurs in summer due to the proximity of the Beaufort Sea and its extensive ice cover. Snow patterns and limited data indicate that considerable wind funneling occurs in valleys to give locally severe wind and turbulence. Reports indicate fierce winds can occur in Wright Pass where the Dempster Highway passes through the western Richardson Mountains. Strong winds also occur as outflow winds in the headwaters of the Blow River. Summer winds are less than in winter.

No representative stations exist, but Eagle Plains in the transition zone to the southwest of the Richardson Mountains can be considered an indicator. James Creek, NWT, has provided some interesting data, but insufficient to date to develop meaningful statistics.

6.3.9 *Arctic Slope*

This is a rather narrow zone lying between the British Mountains and the Arctic Ocean. It ranges in elevation from sea level to 300m with no major ridges extending to the coast. There is little precipitation with annual totals less than 200mm. Most of this falls as rain or drizzle during the short summer. Only small amounts occur in winter. Maximum depths of snow on the ground are normally below 25cm and with little vegetation capable of holding snow in place, the wind blows it about at will. Winters are prolonged, lasting from October to early June. February is the coldest month, a month later than further south, with mean temperatures of -25 to -30°C. Although steady cold is common in winter, extreme minima are not as severe as in the interior, only reaching -50 to -55°C. This is due to conduction of heat upward from the sea through the ice cover, which limits the effective radiational cooling at the surface. Mid-winter spells of above freezing temperature do occur, but are usually associated with high winds due to weather systems that moved eastward from the Bering Strait region. Summers are cool and changeable dependent on whether the wind is blowing onshore or seaward. Warm spells to 30°C do occur but are infrequent. Winds are strong. Although generally east or west along the coast, some extreme southerly outflow winds can occur in winter, particularly down the Blow River valley. Blowing snow is frequent because of the lack of vegetation.

Representative stations are Komakuk Beach and Shingle Point. Some caution should be exercised in using the data, since both are on the coast. In summer the temperature can be considerably higher 2 to 3km inland.

TABLE 6.1

Standard Deviations of Mean Daily Temperatures for Selected Stations

STATION	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
Aishihik	5.6	3.4	3.3	2.0	1.7	1.5	1.1	1.1	1.3	2.5	5.1	5.3	0.8
Anvil	5.5	5.8	2.4	2.0	1.3	1.4	0.9	1.8	1.4	2.4	4.0	5.1	1.1
Beaver Creek	6.0	3.9	3.7	2.8	0.6	1.2	0.8	2.0	1.3	1.8	3.9	3.2	1.1
Boundary	4.3	5.2	3.7	2.7	0.8	0.6	0.6	0.3	2.4	1.2	3.7	5.3	–
Braeburn	5.7	9.1	1.9	1.2	0.6	0.9	0.4	1.5	1.4	1.8	6.4	7.5	1.3
Burwash	5.5	6.8	3.7	2.4	0.8	1.1	0.8	1.6	1.3	2.3	5.2	6.4	1.3
Carcross	6.9	6.1	2.9	2.3	0.4	1.1	1.0	1.8	1.3	1.6	6.3	7.1	1.4
Carmacks	6.7	5.7	4.7	2.2	1.6	1.5	1.1	1.8	1.4	2.1	5.4	6.4	1.3
Clinton Creek	6.4	4.1	4.0	2.9	0.4	1.5	0.9	1.7	2.0	2.4	1.8	4.7	1.6
Dawson	6.6	4.5	3.4	2.5	1.5	1.2	0.9	1.4	1.3	2.5	5.0	5.7	1.3
Drury Creek	5.0	8.3	3.5	2.0	0.9	0.9	0.8	1.0	1.6	1.3	5.8	4.3	0.7
Elsa	5.2	6.7	3.2	2.7	1.9	1.4	1.2	2.2	2.0	3.0	5.1	5.3	1.0
Faro	7.3	2.7	2.5	2.6	0.6	0.8	0.6	1.1	1.4	1.5	7.2	4.8	1.7
Ft. Selkirk	7.1	5.5	4.0	2.1	1.2	1.2	0.8	1.5	1.1	2.5	5.3	6.0	1.4
Haines Junc.	5.5	4.7	3.1	1.8	1.0	1.5	1.0	1.3	1.2	2.4	4.9	5.1	1.1
Johnsons Crossing	5.9	5.9	3.2	1.8	0.7	1.2	0.8	1.4	1.2	1.5	4.9	5.1	5.0
Keno Hill	4.3	7.0	1.3	1.4	1.2	0.9	1.0	1.8	0.9	2.2	4.1	2.3	1.2
Klondike	3.7	4.8	3.6	2.2	0.7	1.1	1.9	1.3	2.0	3.0	4.3	3.2	1.1
Kluane Lake	5.8	7.5	2.9	1.7	0.9	0.9	0.7	1.5	0.9	1.9	5.4	5.9	0.8
Komakuk Beach	4.8	4.1	3.2	2.9	1.7	1.4	1.8	1.9	1.9	2.8	3.5	3.7	1.3
Mayo	6.9	5.9	3.7	2.4	1.4	1.3	0.9	1.5	1.4	2.8	5.8	6.8	1.3
Old Crow	5.0	4.1	2.9	2.8	1.8	1.8	0.9	2.2	2.3	3.1	5.0	4.2	0.9
Quiet Lake	2.5	1.2	7.4	1.4	0.5	1.3	1.6	2.6	1.6	1.8	3.7	0.6	–
Ross River	5.5	6.2	3.3	1.5	0.7	1.3	0.8	1.4	1.1	1.7	5.0	4.9	1.1
Sheldon Lake						0.6	1.0	1.5	1.7				
Shingle Point	4.4	4.5	3.6	3.0	1.9	2.0	1.6	2.5	2.0	2.9	3.7	3.4	1.3
Snag	5.3	3.5	3.8	1.9	1.7	1.5	1.0	1.1	1.1	2.8	4.1	4.3	0.9
Swift River	5.3	4.5	2.8	1.6	0.6	1.5	1.0	1.6	1.0	1.3	4.1	4.2	1.0
Teslin	5.5	4.6	2.5	1.8	1.0	1.6	1.1	1.4	1.3	1.7	4.7	5.2	1.0
Tuchitua	5.4	4.8	3.2	1.9	0.8	1.1	1.0	1.4	1.3	1.6	4.1	4.5	0.9
Watson Lake	5.1	4.3	2.6	2.0	1.1	1.4	1.2	1.5	1.2	2.1	4.8	4.5	1.0
Whitehorse	6.3	5.2	3.1	2.0	1.2	1.6	1.2	1.5	1.3	2.0	5.0	5.8	1.1

TABLE 6.2

Climatological Stations by Climatic Region

1. The St. Elias-Coast Mountains
   - Mule Creek, B.C.
   - Pleasant Camp, B.C.
   - Haines Apps #2, B.C.
   - Logan
   - Divide
2. The Upper Yukon Basin
   - Burwash
   - Carcross
   - Whitehorse
   - Teslin
   - Johnsons Crossing
   - Dease Lake, B.C.
   - Aishihik
   - Braeburn
   - Kluane
   - Dezadeash
   - Haines Junction
   - Atlin, B.C.
   - Telegraph Creek, B.C.
3. The Pelly-Cassiar Mountains
   - Quiet Lake
   - Swift River
   - Cassiar, B.C.
   - Good Hope Lake, B.C.
4. Central Yukon Basin
   - Dawson
   - Mayo
   - Ft. Selkirk
   - Anvil
   - Faro
   - Boundary
   - Beaver Creek
   - Clinton Creek
   - Carmacks
   - Drury Creek
   - Snag
   - Sheldon Lake
5. The Ogilvie-Mackenzie Mountains
   - Klondike
   - Tsichu River
   - Tungsten
   - Ogilvie
   - Dempster
   - Elsa
   - Keno Hill
   - MacMillan Pass
6. Liard Basin
   - Tuchitua
   - Francis Lake
   - Watson Lake
   - Smith River, B.C.
   - Lower Post, B.C.
7. Porcupine-Peel Basin
   - Old Crow
   - Parkin
   - Eagle Plains
8. Northern Mountains
   - James Creek, N.W.T.
9. Arctic Slope
   - Komakuk Beach
   - Shingle Point

TABLE 6.3

Climate Characteristics for Selected Representative Stations in Climatic Regions

CLIMATIC REGIONS	TOPOGRAPHICAL CHARACTERISTICS	REPRESENTATIVE STATIONS ELEVATION m	TEMPERATURE °C			PRECIPITATION mm				WINDS	SUMMERS	WINTERS	UNIQUE CHARACTERISTICS
			MEAN DAILY YEAR	EXTREME MAX	EXTREME MIN	TOTAL	RAIN	SNOW	DAYS WITH				
ST. ELIAS-COAST MOUNTAINS	Average elevation 2500 m south to 3500m in St. Elias Mts.; continental divide is about 160km inland from coast	MULE CREEK, BC 884	-2.8	28.9	-40.0	725.0	274.7	450.3	127	Subject to strong winds, frequently destructive	Cloudy & cool; cold at high levels, warmer E slopes	Very wet & windy outer coast; drier & cold interior	Transition from very wet maritime on outer coast to arid continental on eastern boundary
		PLEASANT CAMP & HAINES APP #2, BC PC274 H400	1.7	32.2	-33.3	1311.1	543.1	768.0	125				
UPPER-YUKON STIKINE BASIN	Plateau with deep NW-SE valleys at elevations of 600-1200m. Some mountains reach 2000m	WHITEHORSE 694	-1.3	34.6	-52.2	268.9	152.2	145.8	119	Windiest basin; occasional destructive winds	Moderate with occas. hot spells, quite dry	Cold but with mild spells; quite dry	Most arid of southern regions, more wind, at times destructive, than in other interior regions
		TESLIN 701	-1.8	33.3	-52.8	330.3	175.7	168.2	134				
PELLY-CASSIAR MOUNTAINS	Average elevation 1500m with peaks to 2500m. Arctic-Pacific divide meanders through southern part of region near Swift River	QUIET LAKE 812	-2.7	32.2	-55.6	577.4	200.2	377.2	115	Relatively light except for local mtn. effects	Cloudy & cool, showery	Moderate, quite freq. mild spells	Significant increase in precipitation compared to Yukon basin to west
		SWIFT RIVER 892	-2.8	31.1	-52.2	592.7	272.4	320.3	147				
LIARD BASIN	Lowest flat area at 700-1000m elevation is open to E; main mountains to south and north	WATSON LAKE 685	-3.3	33.9	-58.9	414.5	239.1	230.1	151	Quite light, 3rd highest freq. of calm	Wettest basin, warm	Cold; mild spells infrequent; high snowfall	Best boreal forest, wettest basin
		TUCHITUA 724	-4.3	32.8	-55.6	629.3	256.0	373.3	147				
OGILVIE-MACKENZIE MOUNTAINS	Elevations 2500-3000m in massive NW-SE Mackenzie block; 1500-2200m in narrower E-W Ogilvies	KLONDIKE 960	-5.8	30.0	-51.7	483.1	204.2	278.9	102	Variable mtn. winds	Cool. Quite wet, especially SW slopes	Moderate in winter inversion, heavy snow	More precipitation in winter than summer & and heavier than at lower elevations
		TUNGSTEN, NWT 1148	-5.0	28.3	-50.0	632.9	310.0	322.9	137				
CENTRAL YUKON BASIN	This basin lower than Upper-Yukon and more remote from Gulf and St. Elias Mts.	DAWSON 323	-5.0	35.0	-58.3	314.5	182.7	151.8	120	Greatest freq. of calms of any basin	Warm with hot spells: record extremes	Cold, extreme lows, odd mild spell	Most continental of all regions, with high variability in min temperatures and precipitation yr to yr.
		MAYO 495	-4.0	36.1	-62.2	325.1	191.4	144.4	115				
PORCUPINE-PEEL BASIN	Elevations 300-600m. Old Crow flats unique lowland with low plateaux elsewhere	OLD CROW 253	-9.9	30.6	-59.4	212.0	108.2	103.8	71	Second high freq. of calms	Short, can get few hot spells	Cold; longest of any region; mid-Oct. – late May	Gulf storms don't impact on this region; winter mild spells infrequent
		PARKIN 533	-6.4	32.2	-48.9	473.0	218.0	255.0	115				
NORTHERN MOUNTAINS	Elevation from 1200 to 1600 m N-S Richardson and E-W British Mts. Treeless but treeline furthest N in Firth R. valley	NONE		–	–	–	–	–	–	Windy; local extreme winds particularly in winter	Erratic, infrequent hot spells	Dry & cold, has inversion effects	Lack of trees contributes to high wind chill but inversion effects can create moderate temperatures
		(INDICATOR EAGLE PLAINS)			–		–	–					
ARCTIC SLOPE	Sea level to 300m, very narrow tundra coastal plain with low foothills	KOMAKUK BEACH 14	-11.7	30.0	-50.0	127.2	75.2	52.0	43	Windiest in Yukon	Cloudy & cool; can be warm & bright with offshore winds	Cold & long; extremes less severe than interior	Coldest weather in Feb. while it is in Jan. in other regions
		SHINGLE POINT 55	-10.6	31.0	-52.2	196.8	110.5	86.3	63				

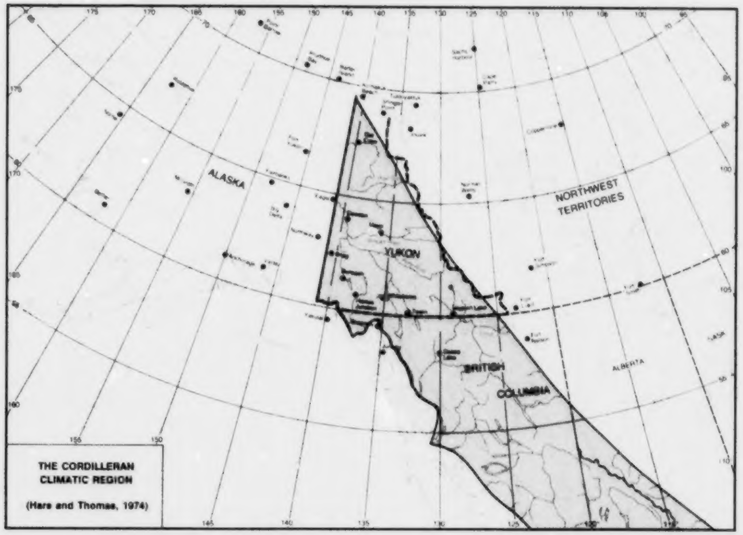

THE CORDILLERAN
CLIMATIC REGION
(Hare and Thomas, 1974)
ALASKA
YUKON
NORTHWEST
TERRITORIES
BRITISH
COLUMBIA
ALBERTA

Figure 6.1 The Cordilleran climatic region according to Hare and Thomas (1974)

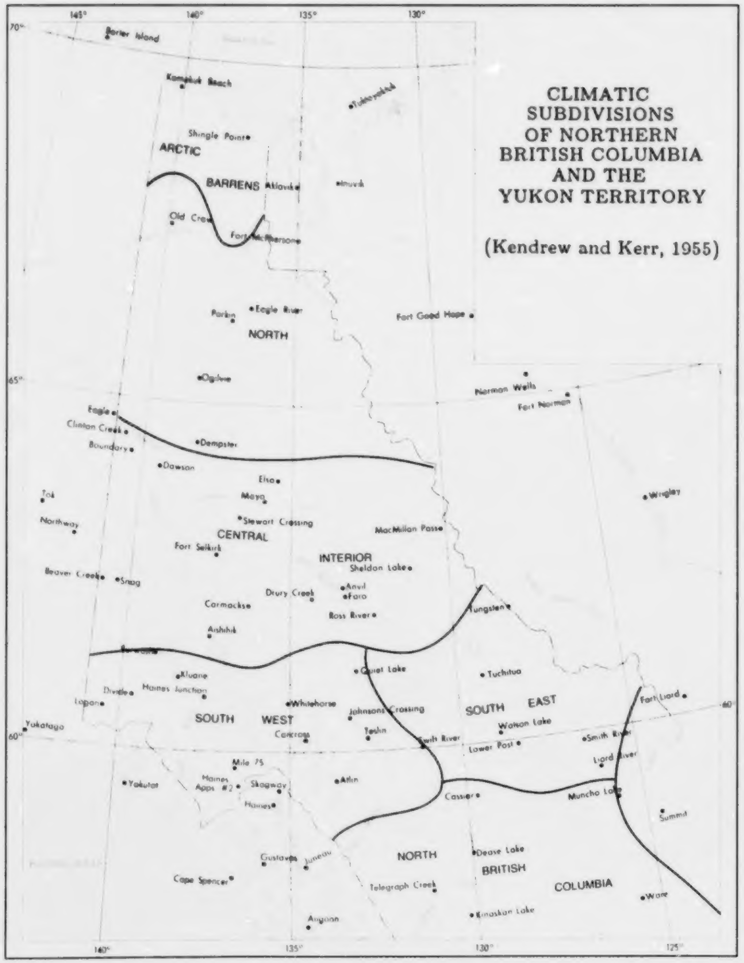

CLIMATIC
SUBDIVISIONS
OF NORTHERN
BRITISH COLUMBIA
AND THE
YUKON TERRITORY
(Kendrew and Kerr, 1955)
ARCTIC
BARRENS
NORTH
CENTRAL
INTERIOR
SOUTH
WEST
SOUTH
EAST
NORTH
BRITISH
COLUMBIA
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Fort McPherson
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Wrigley
Tok
Northway
Stewart Crossing
MacMillan Pass
Fort Selkirk
Sheldon Lake
Beaver Creek
Snag
Drury Creek
Anvil
Faro
Carmacks
Ross River
Aishihik
Tungsten
Quiet Lake
Tuchitua
Kluane
Divide
Haines Junction
Whitehorse
Johnsons Crossing
Fort Liard
Lagone
Yakataga
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Mile 75
Haines Apps #2
Skagway
Yakutat
Haines
Atlin
Cassiar
Muncho Lake
Summit
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
Ware
Kinaskan Lake
Angoon
70°
65°
60°
145°
140°
135°
130°
125°

Figure 6.2 Climatic subdivisions of northern British Columbia and the Yukon Territory according to Kendrew and Kerr (1955)

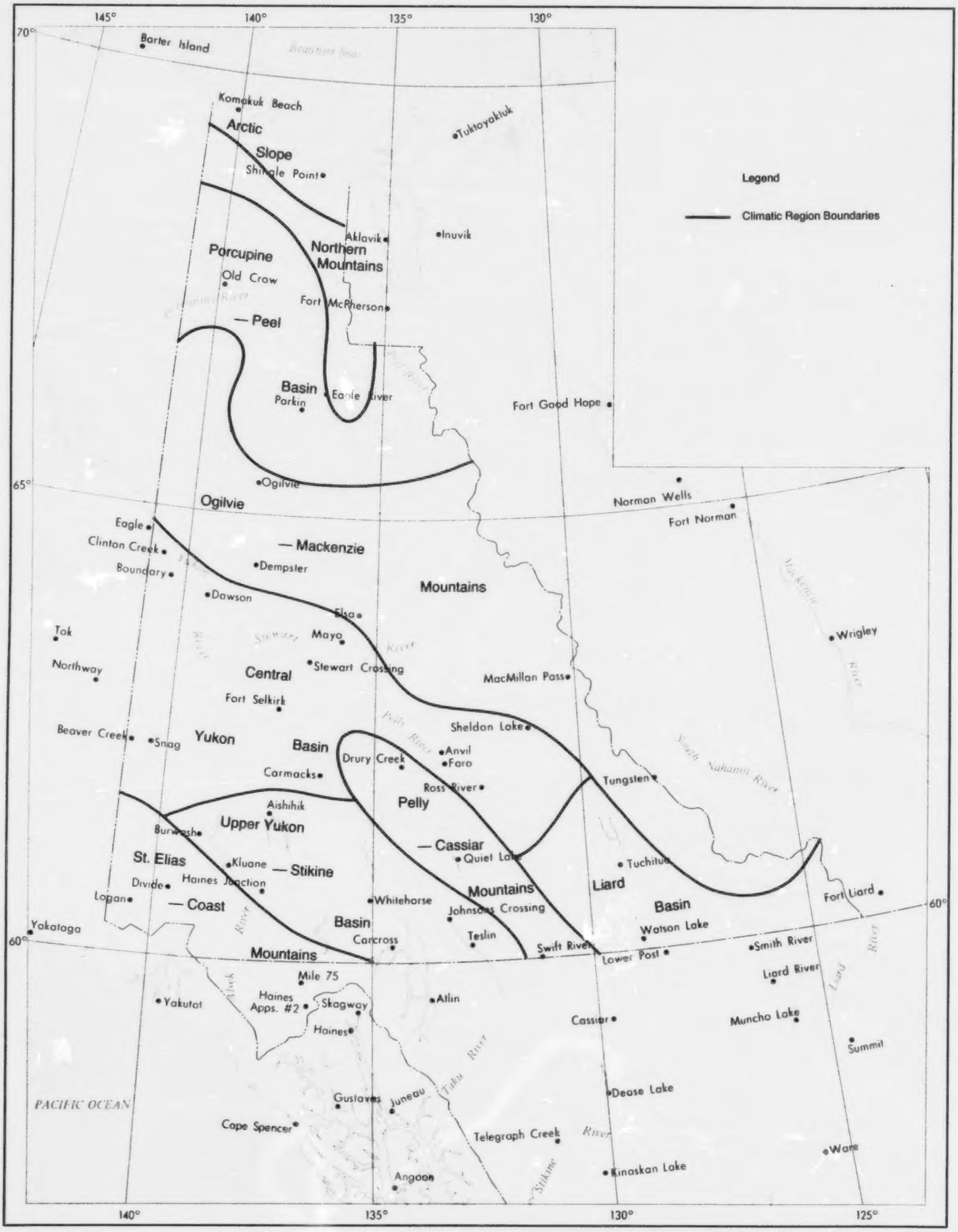

145°
140°
135°
130°
70°
Barter Island
Komakuk Beach
Arctic
Slope
Shingle Point
Tuktoyaktuk
Legend
Climatic Region Boundaries
Aklavik
Inuvik
Porcupine
Northern
Mountains
Old Crow
Fort McPherson
— Peel
Basin
Parkin
Eagle River
Fort Good Hope
65°
Ogilvie
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
— Mackenzie
Dempster
Dawson
Mountains
Elsa
Tok
Mayo
Wrigley
Northway
Stewart Crossing
Central
MacMillan Pass
Fort Selkirk
Beaver Creek
Snag
Yukon
Basin
Sheldon Lake
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
Pelly
Aishihik
Upper Yukon
Burwash
St. Elias
Kluane
— Stikine
— Cassiar
Quiet Lake
Tuchitua
Divide
Haines Junction
Mountains
Liard
Logan
— Coast
Whitehorse
Johnsons Crossing
Basin
Fort Liard
Yakataga
Basin
Teslin
Watson Lake
60°
60°
Carcross
Mountains
Swift River
Lower Post
Smith River
Mile 75
Liard River
Yakutat
Haines Apps. #2
Skagway
Atlin
Haines
Cassiar
Muncho Lake
Summit
Dease Lake
PACIFIC OCEAN
Gustavus
Juneau
Cape Spencer
Telegraph Creek
Ware
Kinaskan Lake
Angoon
140°
135°
130°
125°

Figure 6.3 Climatic regions of Yukon

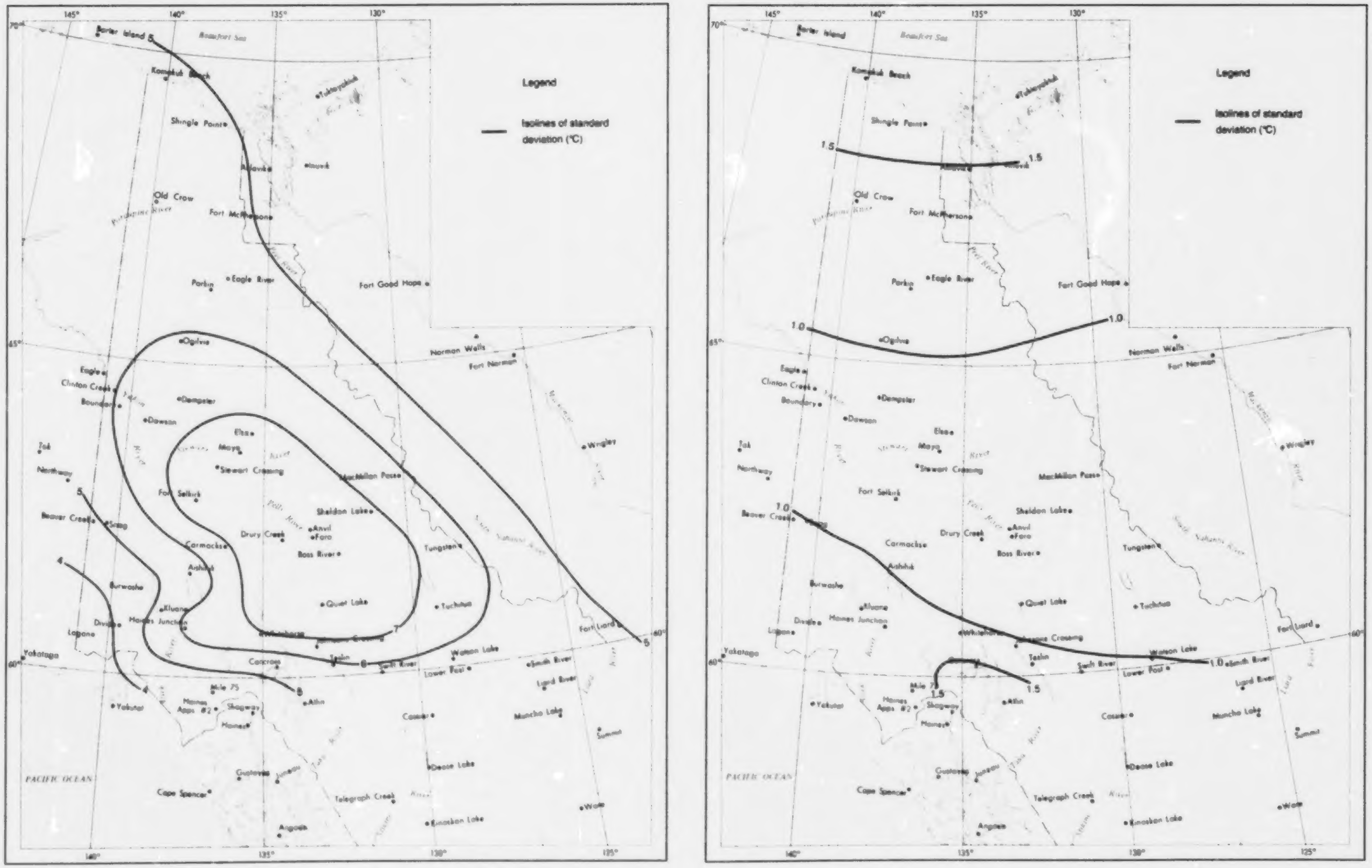

Legend
Isolines of standard deviation (°C)
Beaufort Sea
PACIFIC OCEAN
145°
140°
135°
130°
125°
70°
65°
60°
5
7
8
4
1.5
1.0
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Fort McPherson
Porcupine River
Parkin
Eagle River
Fort Good Hope
Norman Wells
Fort Norman
Ogilvie
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Stewart Crossing
MacMillan Pass
Wrigley
Tok
Northway
Fort Selkirk
Sheldon Lake
Anvil
Faro
Beaver Creek
Snag
Carmacks
Drury Creek
Ross River
Tungsten
Aishihik
Burwash
Kluane
Haines Junction
Quiet Lake
Tuchitua
Divide
Lagona
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Carcross
Mile 75
Liard River
Atlin
Haines Apts #2
Skagway
Haines
Yakutat
Cassiar
Muncho Lake
Summit
Dease Lake
Gustavus
Juneau
Telegraph Creek
Cape Spencer
Ware
Kinaskan Lake
Angoon

Figure 6.4 Standard deviations of mean temperature for January and July

7. PRESSURE AND WIND

7.1 Pressure

The major force causing air to move is spatial differences in atmospheric pressure. Air pressure decreases with elevation. It is measured at the earth's surface from which an estimate of an equivalent pressure at mean sea level is made. The analysis of a set of such values for a given time results in mean sea level patterns of high and low pressure. Such charts are routinely produced every six hours, based on Greenwich Mean Time (GMT), at major weather centres around the world.

The average mean sea level pressure patterns over the 30-year normal period, 1951-1980, for mid-season months over Yukon are shown in Figures 7.1-7.4. High pressure dominates the central Yukon in winter (Figure 7.1), which results in long periods of light or calm wind conditions particularly in the Dawson-Mayo area. Away from the central high pressure, winds are stronger (in the southwestern Yukon and on the Arctic coast). The high shifts northeastward in spring leaving Yukon generally under the influence of a southeasterly flow. At several locations in the interior of Yukon, April and May are the windiest months (Table 7.1). Low pressure with weak gradients prevails over Yukon in summer which results in less wind than in the spring. A southeasterly flow returns to Yukon in the fall as low pressure begins to dominate the Gulf of Alaska and the Arctic high intensifies over the Beaufort Sea. The mean pressure pattern for October (Figure 7.4) does not emphasize the active storm track across southern Yukon as the only indication on the mean chart is low pressure in the Gulf and in the Ft. Simpson-Ft. Nelson area. Winds are variable and can be quite strong with individual fall storms affecting Yukon. Fall is generally almost as windy as the spring except it is more so at some localities such as Whitehorse and along the Arctic coast. The changes in pressure patterns from season to season are described in more detail in section 12.2.

In the atmosphere, pressure decreases with altitude and selected standard pressure levels correspond to mean altitudes as follow: 85-kPa (1457m), 70-kPa (3012m) 50-kPa (5574m) and 30-kPa (9164m). The contour patterns of these pressure surfaces are routinely analysed twice per day. Surface pressure centres generally follow the mean flow at 50-kPa. Mean mid-season patterns at this level are shown in Figures 12.6-12.9 and are discussed in section 12.2.

7.1.1 *Pressure-Wind Relationship*

In general, three forces determine wind. These are the pressure gradient, Coriolis, and frictional forces.

The pressure gradient force acts from areas of high pressure to lower pressure. The Coriolis force is caused by the earth's rotation. It causes particles in motion to be deflected to the right in the northern hemisphere and in proportion to the speed of the air parcel. Thus, air being forced from an area of high to low pressure by the pressure gradient force would not proceed directly from the high to the low centres but instead would rotate around the low centre in a counterclockwise fashion.

Frictional forces arise from the interaction of moving air with the earth's surface, and vary with the surface roughness. By reducing the speed of the air parcel, the Coriolis force is reduced while the pressure gradient is not. Thus, the resultant flow is inward towards the low pressure centre and outwards from a high.

Generally, winds blow counterclockwise around a low centre with a light inward component that varies with the magnitude of the frictional forces. Similarly, the flow around a high is clockwise with a slight outward motion. Air within a low is usually ascending while that in a high most often subsiding. The greater the pressure gradient between high and low centres, the strong the resultant wind.

Differential heating or cooling of the underlying surface will change the density of the surface air which can create local pressure gradients that may enhance or oppose the gradient due to regional pressure patterns.

7.2 Wind

Most of the weather elements are affected by wind – enhanced, moderated, modified, or changed. A hot summer day can be made to feel more pleasant by a fresh wind; a cool fall or winter day can be made bitterly cold; ordinary rain may become a stinging, driving, blinding experience; snow is piled into drifts or reduces visibility to near zero; clouds are driven into or out of the sky – all by a meteorological element we cannot see.

7.2.1 *Wind-Topography Relationships*

Atmospheric pressure differences are the cause of large scale wind patterns; however, mountainous terrain distorts the flow in many ways. Even small hills can distort the flow for a considerable distance downstream and to a lesser degree in the vertical depending on the stability of the air mass. In unstable air the flow tends to follow the profile of the terrain while in stable conditions the distortion is damped out with height. Small scale circulations are set up due to topography deflecting, funneling or channeling the wind flow resulting in marked differences in both wind speed and direction over short distances. Air will follow the terrain much the same as water follows a ditch or valley. Wind that is funneled into a narrow valley will experience an increase in speed. Thus, mountain passes oriented in the same direction as the prevailing pressure gradient are indeed windy and frequently referred to as having super-gradient winds.

Differential heating or cooling along coasts creates local pressure forces which set up sea breeze circulations during the day and land breezes at night. The same process at work on mountain slopes causes anabatic (upslope) wind on a sunny slope and katabatic (downslope) wind on a shaded slope or at night. Slope winds are usually light and can be nullified by stronger regional pressure gradients.

There are exceptions; for example, a katabatic wind off a glacier in the same direction as the regional pressure gradient can set off a fierce local wind at the foot of the glacier or in the valley. When extremely cold air builds up over the interior of Yukon in winter and a low pressure centre moves along the north coast or the Pacific coast, strong outflow winds can develop in major mountain passes or off large glaciers. These combination pressure gradient-funneled-katabatic winds can reach 100km/hr with temperatures near -40°C. For example, the Chilkat Pass area of the Haines Highway between Haines Junction Yukon and Haines Alaska, and also down the Blow River on the north coast near Shingle Point experience such ferocious blizzard conditions.

Valley winds are usually on a larger scale than slope winds but are generally still a mesoscale phenomenon. When the entire air mass in the valley becomes warmer than in the surrounding area and the regional pressure gradient is relatively light, an up-valley wind develops usually in late morning. It is most pronounced in summer as it is primarily a result of convection. After sundown as the air cools, a down-valley wind becomes established. These winds can reach speeds of 15-25km/hr (Janz and Storr, 1977). Downslope and down-valley winds are active both summer and winter. Cold air drainage due to such circulations is in part responsible for low temperatures experienced in concave frost hollows.

Whitehorse experiences more wind than some other localities in southern Yukon because valley effects and the regional pressure gradient reinforce one another especially in the spring and the fall (Table 7.1). When the pressure gradient is moderate to strong the wind speed generally increases quite uniformly with height in the free atmosphere. There are exceptions; for example, at Burwash in the Kluane Valley in winter, when the wind above the valley top is light a low-level southeasterly jet maximum can develop at mid-valley elevations reaching 10-15m/sec (36-54km/hr) (Nikleva, 1984). A similar but less pronounced phenomenon was observed in the Beaver Creek area at the north end of the valley. This well developed down-valley circulation likely occurs at other Yukon locations. It should be noted, however, that low-level jets also occur over flat terrain.

In the free atmosphere wind speed normally increases with elevation; however, the topographical influence can far outweigh the elevation influence. This is illustrated in Figure 7.5 after Berenger and Gerbier (in Queney *et al.*, 1960) who found that the shape of the mountain obstruction has a marked effect on how the wind field is altered. Along vertical faces winds can be light or calm at one spot, but only a few metres away it can be blowing a gale in the opposite direction (Figure 7.5 (c)). This flow shows, to a degree, the circulation at Haines Junction immediately north of the massive Auriol Range. A general southerly flow creates surface winds of 30km/hr at Burwash – some 110km north of these mountains. However, at Haines Junction just north of this range, winds are usually northerly at about 5km/hr – the opposite of the prevailing gradient direction. It is believed that a lee eddy creates this condition. Aircraft descending over Haines Junction in such flow often indicate southerly winds down to about 200m above ground level then chaotic wind conditions below. When a very strong southerly gradient prevails, the light north surface wind is still common at Haines Junction, but is interrupted occasionally by short bursts of southerly surface winds near 100 km/hr.

Where well-defined northwest-southeast valleys prevail like at Burwash, at Bear Creek some 10km west of Haines Junction and in the Kathleen River valley about 10km to the east, southeast winds are continuous although the speed may vary from one valley to the other. In east-west valleys under such conditions surface winds may be light or certainly much different than those at higher elevations.

Janz and Storr (1977) have examined the effects on wind of topography and vegetation. Various types of local winds in mountainous terrain and several methods for indirect determination of wind patterns are described. They cite several references where more detailed information can be obtained: Wilson (1968, 1973) and Geiger (1965) give a complete theoretical explanation of local topographical effects; Schroeder and Buck (1970) on wind effects of forest stands; and Holroyd (1970) on how wind patterns can be mapped by flag trees.

7.2.2 *Wind Direction*

Wind direction in general due to the pressure gradient is discussed in section 7.1. Figures 7.6-7.20 compare the quarterly percentage frequencies at 15 stations. Prevailing winds by months and for the year for selected stations are given in Table 7.1. Some of these stations have records of 6 years or less so the results should be treated with caution.

The dominant directions over interior Yukon mainly coincide with the orientation of the valleys. An examination of the quarterly frequencies shows that the pattern of wind direction at a given station changes little throughout the year although the frequencies vary somewhat season to season. A number of stations show direction is shared between two almost opposite directions due to valley channeling effects, for example, at Whitehorse, Old Crow, Faro, Watson Lake, and Aishihik. At Komakuk Beach on the north slope, the wind direction is close to the alignment of the coast. There is more diversity at the other stations, also surprisingly, between some stations that are relatively close together. For example, the prime directions at Burwash and Aishihik are about 90° out of phase while at Kluane Lake, 110km to the south, the pattern is quite different than either of the other two. These differences are due to variations in alignment of topography from one location to the other.

7.2.3 *Wind Speed*

The mean monthly and annual wind speeds together with the standard deviations and extreme values are given in Table 7.1. Annual averages range from a high of 20.8km/hr at Komakuk Beach to a low of 3km/hr at Dawson A. Note the very low wind speeds in winter months especially at Dawson, Beaver Creek and Snag, but only in January at Old Crow and Watson Lake.

It should be noted that many stations exhibit a high percentage of calm conditions. Dawson A shows the highest annual percentage of calm winds (58%) as well as the highest quarterly percentage (76% for December-February), (Figures 7.6-7.20). Mayo is next with 40% calm winds annually and 59% for the winter quarter and greater than 60% in December and January. Snag and Old Crow have annual percentages of 32% and 27% while their winter quarters show 46% and 53% respectively. Most stations have at least one quarter where the percentage of calm winds exceeds 25%. The northern coastal stations, Kluane Lake and Whitehorse are exceptions. Frequency of calm conditions are also part of the depiction by months in Figures 7.25-7.29. Since these periods of calm are reflected in the calculation of the mean value, the resulting low average may tend to mislead. Winds in excess of 30km/hr do occur particularly on the north coast.

The percentage of time the wind exceeds given values for all directions, at selected stations, is shown in Figures 7.21-7.24. Winds exceed 20km/hr 40% of the time at Komakuk Beach, 32% at Shingle Point, 30% at Whitehorse, and 26% at Burwash. At the other localities this value is exceeded only 5 to 14% of the time. Winds exceed 30km/hr 20% of the time at Komakuk Beach, 14% at Shingle Point, 10% at Burwash, 8% at Whitehorse and under 5% at other sites. Mayo, Snag, Teslin and Beaver Creek all indicate that this threshold is exceeded less than 1% of the time. Stations on the north coast that have the highest frequency of winds greater than 40km/hr show that most occur in winter with a definite minimum in summer (Figures 7.25 and 7.26).

The annual and monthly percentage frequencies of wind speeds by wind speed classes (Figures 7.25-7.29) show, in general, a decreasing percentage of occurrence as wind speeds increase. Burwash, Komakuk, and Shingle Point are the exceptions with each showing a higher percentage of wind speeds in the 11-20km/hr class than in the 1-10km/hr class. Whitehorse is about evenly distributed between the two classes.

Shingle Point, on the Arctic coast, shows the highest mean monthly wind speed (26.4km/hr in November) with Komakuk (24.6km/hr for January) a close second. Not counting the coastal stations, Whitehorse with 16.4km/hr for October has the highest mean monthly wind speed. Aishihik at 13.9 (March) and Old Crow at 12.4km/hr (July) are next. The lowest speeds are recorded at Beaver Creek (1.6km/hr in December) and Dawson A (1.7km/hr in January and February), (Table 7.1).

There is considerable variability in wind speed between stations of different elevations. As mentioned in section 5.2, the shape of the topography, vegetative cover and other factors may overshadow the wind speed-elevation relationship. No simple quantitative relationship is possible to equate the wind speed at these sites even though some are short distances apart.

Within each climatic region both wind speed and direction are quite variable due to topography. The Arctic Slope is the region with the most consistent and significant wind pattern since it is essentially a plain, except local extremes occur in the Blow and Babbage River valleys. The Upper Yukon-Stikine Basin region experiences significant southerly or northwesterly winds as the valleys are generally aligned southeast to northwest, also the regional pressure gradient often favours this direction. This region also has more destructive winds than others because it is closer to the Gulf of Alaska storms and wind patterns are influenced by the St. Elias-Coast Mountains. The Central Yukon Basin region experiences the greatest frequency and duration of calm conditions. Next is the Porcupine-Peel Basin followed by the Liard Basin. All mountain regions have variable wind conditions with the most severe in the St. Elias-Coast Mountains region.

To determine wind characteristics at new locations, instrument observations are desirable, even if only for a short period to confirm or deny wind behaviour determined from indirect methods, i.e. flag trees, patterns of snow deposition or drifting etc., or to determine if a significant correlation exists with a standard nearby site.

7.2.4 *Extreme Wind*

As is to be expected, the Arctic coastal stations report the highest extreme hourly wind speeds (Table 7.1). Shingle Point shows 84km/hr December 14, 1979, and Komakuk Beach 75km/hr March 18, 1981; the synoptic chart for the former case is shown in Figure 7.30. Elsewhere Aishihik has reached 57km/hr (March), Burwash 52km/hr (January), Kluane Lake 47km/hr (December) and Whitehorse 44km/hr (December). The synoptic pattern that prevailed for December 31, 1980, in Figure 7.31 created destructive winds in particular at Mule Creek and in the high country southwest of Ross River. In most areas the highest extremes occur in the cold months.

The Gumbel method (section 4.2.1) was utilized to determine probable values of extreme wind speed for various return periods. As few long-term records exist for Yukon return periods for extreme wind speeds are given for some stations with records of less than

15 years. Those results for stations with short-term records should be used with caution. The estimates shown in Table 7.2 are average one-minute values. The highest estimated extreme speed for interior Yukon stations occurs at Burwash where the value is 115km/hr for a 30-year return period. The second highest is at Aishihik at 100km/hr and third is at Whitehorse at 82km/hr, all for a 30-year return period. Values at Komakuk Beach and Shingle Point are likely higher than the aforementioned, but calculations were not carried out due to the limited length of their wind records.

7.2.5 *Upper Winds*

Hodographs depicting the annual vector winds at the 85-, 70-, 50-, and 30-kPa levels (standard levels) for Whitehorse are shown in Figure 7.32. The predominance of the NNW-SSE winds at 85-kPa is a reflection of the valley influence and the prevailing MSL pressure gradient which particularly in spring and fall favour these directions. The pattern in the free atmosphere changes with height to a broad but dominant westerly flow. Speeds increase with height with the maxima ranging from 30km/hr at 85-kPa to near 85km/hr at 30-kPa.

The vector winds at standard levels for mid-season months are shown in section 12 (Figures 12.4-12.7). The January pattern is similar to that for the year except in January and other winter months there are stronger winds from the NNE-NE at the 50- and 30-kPa levels than in other seasons. The northwesterly component is dominant in March as the other westerly winds diminish slightly. This northwest component weakens through the second quarter to result in a roughly circular hodograph pattern at all levels and with speeds reduced by July.

As summer passes, the westerly components of wind speeds begin to increase at all levels, particularly at 30-kPa where the west wind exceeds 100km/hr by September. These high wind speeds continue through December, diminishing slightly and veering to the north in November and December. The northwesterly winds at 50-kPa and 70-kPa increase in the last quarter of the year. The 85-kPa wind pattern changes little throughout the year, but speeds are less in summer.

7.2.6 *Wind-Chill*

Wind-chill is a measure of the rate of heat loss from an exposed object measured in units of watts/sq m. At 1200 watts/sq m it becomes unpleasant to be outdoors while at 2700 watts/sq m exposed flesh is liable to freeze within half a minute for the average person (AES, 1976). The wind-chill is most severe when strong winds occur with ambient temperatures well below freezing. It can produce life-threatening conditions to those who do not understand wind-chill and its repercussions and/or are foolhardy and do not take proper precautions.

Wind-chill is usually expressed in one of three ways – as an equivalent temperature; as an actual cooling rate; or as a comfort class. The latter is depicted in Figure 7.33 because it simply assigns a number from one to seven to successive ranges of cooling rates and provides a verbal description of the affects on human activity as well as a sensible action plan. For a more detailed discussion of wind-chill the reader is referred to Maxwell (1980).

Fortunately most severe cold spells in Yukon are accompanied by calm or light winds particularly in the lower Yukon-Porcupine-Liard climatic basin regions. However, severe wind-chill effects occur, particularly on the north coast, on treeless surfaces at higher elevations, in mountain passes and/or where severe outflow winds occur with very low temperatures (section 7.2.1). A few notable examples are Chilkat Pass, the Blow River Valley and at the foot of glaciers in the St. Elias-Coast Mountains region. Significant wind-chill usually occurs with strong winds that herald the end of a lengthy cold spell. Fortunately there is mixing with more moderate air aloft so wind-chill in Yukon is usually less severe than in the eastern Arctic.

Wind-chill, even at above-freezing temperatures, can be dangerous. Death due to hypothermia (lowered deep-body temperature) is commonly associated with accidental immersion in cold water. The body renders its heat to water much more quickly than to air of the same temperature. According to the Canadian Red Cross Society unconsciousness can occur when the deep-body temperature falls from the normal 37.5°C to approximately 32°C. Cardiac arrest is the usual cause of death when body temperature cools to below 30°C. Prolonged exposure of an inadequately clad body to wind and low temperatures especially in wet weather can cause dangerous hypothermia. Mountain wilderness areas can be life threatening to ill-equipped hikers who have little knowledge of the dangers associated with body heat loss as a result of severe cooling rates, not necessarily at sub-freezing temperatures.

7.2.7 *Wind Energy*

Resident and industry dependence on energy is not only a matter of conservation and economics in Yukon – it's a matter of survival. Hydro power is used in southern Yukon and there are numerous untapped sources. Precipitation can, however, be extremely variable in time-of-fall and areal extent from year-to-year which does create water level problems in hydro systems. Direct solar energy, although plentiful in summer in southern Yukon is almost non-existent in winter when the highest demands for energy occur. In early history almost every Yukon settlement had a sawmill as wood was the main fuel. Wood is still used extensively and gaining in popularity. Wood smoke creates, however, a potential air pollution problem particularly in large communities when poor ventilation conditions prevail.

There is one energy source gaining world-wide attention, yet generally untapped – wind. It has been successfully exploited in Australia and Switzerland where small wind machines have provided energy to remote facilities for many years. Janz *et al.* (1982) studied wind energy in the Northwest Territories. They did not examine potential for Yukon, but the neighbouring Mackenzie Valley was assessed as having poor wind energy potential. The coast bordering the Beaufort Sea was assessed to have marginal to good wind energy potential with the best conditions offshore.

The approximate energy produced by the wind over one hour is given by the expression:

$$P = 1.38 \times 10^{-5} V^3$$

where V is in km/hr, and P is in kWhr.

This energy equation is valid only for instantaneous wind measurements although hourly values can be used without introducing too large an error. Monthly and annual wind speed averages cannot be used in this equation. AES (1976) analysed hourly wind data for several Canadian stations and determined monthly and annual wind energy values in wind classes between 10 km/hr and 58 km/hr. Lamont (1976), (cited by Janz *et al.*, 1982), used this work as a basis to arrive at a regression equation relating mean monthly wind speed and mean monthly wind energy (Figure 7.34). The mean monthly wind speed from Table 7.1 may be used to determine the approximate mean monthly wind energy potential for various Yukon stations. For example, at Komakuk Beach the average wind speed of 24.6km/hr in January, the windiest month, equates to 250kWhr of energy for that month. This compares to a total potential wind energy value of 214kWhr in January at Cambridge Bay where the mean January win speed is 23.4km/hr (based on a rigorous calculation of the energy equation). The Lamont method indicates approximately 230kWhr for January. Cambridge Bay is assessed to have good wind energy potential. For a detailed discussion of the basic principles and other matters related to wind energy technology the reader is referred to Janz *et al.* (1982).

Wind energy conversion systems (WECS) vary considerably in appearance and complexity yet the basic principles are similar. It is noted from the above equation that the energy developed is dependent on the cube of the wind speed so the greatest energy production is at high wind speeds.

WECS generally have a cut-in speed – the lowest wind speed at which the rotor will turn to produce energy. This speed varies with the machine design but is usually between 10 and 15km/hr. Systems need a means to store energy for periods when winds are below the cut-off speed. Winds exceed 15km/hr 54% of the time at Komakuk Beach, 50% at Shingle Point, 44% at Whitehorse, 36% at Burwash, 24% at Aishihik and less than 20% of the time elsewhere. At the lower end of the spectrum are Snag at 8% and Beaver Creek at 3% (Figures 7.21-7.24).

WECS usually have a rated speed – the wind speed at which the generator produces the advertised power. With wind speeds above the rated speed the system produces energy at a constant rate. Rated speeds vary considerably, but are usually in the 30km/hr to 50km/hr range. Winds exceed 30km/hr 20% of the time at Komakuk Beach, 14% at Shingle Point, 10% at Burwash, 8% at Whitehorse, 4% at Aishihik and less than 2% of the time at other stations that have wind records (Figures 7.21-7.24).

Frequency of specified duration lengths (hrs) within defined conditions of wind speed (km/hr) for selected stations are displayed in Tables 7.3 to 7.17. Condition 01 represents wind speed in the zero to 15km/hr range; condition 02 – wind speed ranging from 16 to 29km/hr and condition 03 – wind speed greater than 29km/hr. Duration ranges are for intervals of 1 to 6 hrs up to 73 hrs or more and the longest duration is specified for each condition of wind speed. The last column gives the % frequency of the hourly wind in each condition.

As an example, for Aishihik (Table 7.3) over the period of record in January, there were 168 occasions or events when winds in the zero to 15km/hr interval lasted 1 to 6 hrs. For 41 events such wind conditions prevailed for 73 or more consecutive hours with the longest duration in the record being 717 hrs. The extreme hourly wind (maximum in condition 03) was 80km/hr. Hourly winds were in condition 01 category 88% of the time – these winds are below the WECS cut-in-speed so storage facilities would be needed about 88% of the time. Storage needs lasted 717 hrs on at least one occasion. Hourly winds were in condition 03 only 6% of the time – in the WECS rated speed range – which indicates poor wind power potential at Aishihik.

The characteristics of WECS generally suggest that they operate best where winds are seldom below 15km/hr (to minimize storage capacity) and most frequently in the 30 to 50km/hr class day-to-day (to maximize power output). Areas with destructive winds may not be suitable for WECS installations.

Wind records to date suggest that the area with the highest wind energy potential in Yukon is in the Arctic Slope climatic region, but this likely applies also to the Northern Mountains region. These zones have their highest mean winds in the cold months and the wind speed exceeds 15km/hr (cut-off speed) 50% or more of the time. A more detailed study is recommended as the wind exceeds 30km/hr (base of rated speed range) only 15 to 20% of the time. Note in Table 7.1 that the standard deviations for mean monthly speeds are quite large indicating great variability in wind speed from year-to-year. Some form of back-up or auxiliary power supply would most likely be required, even where potential is high, because of the variability from year-to-year. The Upper Yukon-Stikine basin region may have some northwest-southeast valleys that have significant wind energy potential, for example, the Bear Creek and Kathleen River Valleys. Although mean monthly wind speeds and the prevalence of calm periods suggest low wind energy potential in the Central Yukon basin climatic region, there may be suitable local sites at higher elevations. It should be noted, however, that in the basin climatic regions, there are prolonged periods of calm during the high energy requirement months.

As mentioned in sections 5.2 and 7.2.1 topography can have a profound influence on wind patterns. The wind can vary in both speed and direction over short horizontal and vertical distances so marginal energy potential at a known site may be changed to acceptable potential by proper wind prospecting (searching for a site with the most suitable wind regime). Janz *et al.* (1982) describe various techniques in site selection, including site modification to maximize wind flow.

TABLE 7.1

Monthly and Annual Means, Extremes, and Standard Deviations of Wind Speed (km/h), and Prevailing Direction for Selected Stations

STATIONS		J	F	M	A	M	J	J	A	S	O	N	D	YR
Aishihik	Mean	6.1	8.9	8.9	11.0	13.9	12.3	11.4	10.9	10.7	11.5	8.5	6.9	9.2
(1953-1966)	Extreme	41	37	41	35	38	32	37	33	37	42	50	57	57
	Std. Dev.	6.3	7.4	6.5	6.5	6.9	5.5	5.3	5.9	6.6	7.5	7.3	7.0	
	Prev. Dir.	S	S	S	S	S	S	S	S	S	S	NNE	S	S
Beaver Creek	Mean	2.0	2.6	4.1	5.6	6.3	5.9	5.0	4.7	4.4	3.4	2.2	1.6	3.2
(1970-1977)	Extreme	12	13	13	16	13	11	9	11	14	14	16	12	16
	Std. Dev.	2.0	1.8	1.9	2.3	1.9	1.3	1.2	1.5	2.0	2.2	1.9	1.8	
	Prev. Dir.	S	S	S	NW	NW	NW	NW	NW	NW	NW	S	S	NW
Burwash A	Mean	8.1	10.6	10.7	15.4	16.2	13.7	12.7	13.0	14.5	15.4	12.1	8.6	12.6
(1967-1981)	Extreme	52	47	46	45	41	41	39	44	48	49	50	45	52
	Std. Dev.	9.6	10.6	8.0	9.2	9.0	7.0	6.7	7.7	8.9	10.0	9.6	9.0	
	Prev. Dir.	NNW	NNW	NNW	ESE	ESE	ESE	ESE	ESE	SE	WNW	WNW	WNW	ESE
Dawson A	Mean	1.7	1.7	3.7	5.7	6.6	5.4	4.1	4.2	4.0	3.9	2.2	2.0	3.0
(1976-1981)	Extreme	16	10	13	15	19	15	10	13	16	16	13	11	19
	Std. Dev.	2.5	2.2	2.9	3.0	3.3	2.4	2.0	2.5	3.0	2.8	2.4	2.5	
	Prev. Dir.	ENE	SW	E	E	E	WSW	SW	E	ENE	E	ENE	SW	E
Faro	Mean	5.6	6.2	8.2	9.5	10.6	9.9	9.4	7.7	7.7	8.1	6.5	6.0	7.9
(1972-1977)	Extreme	21	22	21	20	20	18	22	16	19	20	23	28	28
	Std. Dev.	4.8	5.3	4.2	3.6	3.2	2.8	3.0	2.4	3.2	4.0	5.4	5.3	
	Prev. Dir.	SE	SE	SE	SE	SE	SE	NW	NW	SE	SE	SE	SE	SE
Kluane Lake	Mean	6.5	7.6	8.4	9.9	9.1	8.9	8.2	9.3	10.2	9.9	11.1	8.5	9.0
(1975-1980)	Extreme	33	32	22	29	18	16	17	30	30	36	33	47	47
	Std. Dev.	5.3	6.0	3.8	4.5	2.6	2.4	2.3	3.8	4.9	4.5	5.8	6.9	
	Prev. Dir.	SE	SW	SW	SW	SW	SW	SW	SW	E	SE	SE	E	SW
Komakuk Beach A	Mean	24.6	21.9	23.3	20.3	21.6	19.3	17.8	16.6	16.8	20.9	24.0	22.1	20.8
(1976-1981)	Extreme	68	61	75	61	57	46	39	48	49	63	64	61	75
	Std. Dev.	15.2	11.6	13.8	12.5	12.9	8.5	8.5	8.8	8.7	12.8	13.6	13.8	
	Prev. Dir.	W	W	W	W	E	E	E	W	W	W	W	W	W
Mayo A	Mean	4.7	6.0	8.9	8.9	7.6	5.3	4.2	4.5	6.4	9.2	6.0	4.3	6.3
(1974-1981)	Extreme	26	27	28	23	22	17	15	15	26	24	22	24	28
	Std. Dev.	5.7	6.6	6.2	4.2	4.0	2.6	2.5	2.5	4.6	5.7	5.7	5.9	
	Prev. Dir.	N	N	N	N	N	N	N	N	N	N	NNE	N	N
Old Crow	Mean	2.7	6.0	2.5	8.5	12.1	11.0	12.4	–	10.0	9.4	6.8	6.8	8.0
(1975-1976)	Extreme	17	21	10	19	29	22	20	–	30	22	21	25	30
	Std. Dev.	4.4	6.9	3.4	4.5	5.6	4.9	3.7	–	6.3	6.4	5.8	7.4	
	Prev. Dir.	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Shingle Point A	Mean	21.6	20.1	14.6	11.8	12.1	15.6	17.3	17.3	17.5	18.2	26.4	20.0	17.7
(1974-1981)	Extreme	64	78	56	38	43	32	43	42	54	58	68	84	84
	Std. Dev.	13.6	14.1	8.7	6.4	5.3	5.0	6.7	7.0	7.8	10.2	15.9	15.0	
	Prev. Dir.	NW	NW	NW	NW	NW	N	NW	NW	NW	NW	SW	NW	NW
Snag A	Mean	2.3	3.9	5.7	7.4	8.2	7.9	6.8	6.2	6.1	5.5	3.5	2.5	5.5
(1953-1966)	Extreme	25	29	25	26	22	21	16	22	21	23	23	17	29
	Std. Dev.	3.4	4.0	4.3	4.6	3.2	2.9	2.7	3.1	3.6	4.1	3.5	3.2	
	Prev. Dir.	E	E	NW	NW	NW	NW	NW	E	NW	NW	NW	SW	NW
Teslin A	Mean	5.2	6.4	7.3	8.6	8.9	9.0	8.7	7.9	8.0	9.5	9.0	6.8	7.9
(1953-1974)	Extreme	25	24	24	26	24	24	23	20	24	25	24	28	28
	Std. Dev.	4.5	5.0	4.6	4.3	3.6	3.7	3.5	3.3	4.1	4.5	4.1	4.9	
	Prev. Dir.	E	E	E	S	S	S	S	S	NE	NE	ENE	ENE	E
Watson Lake A	Mean	3.9	5.6	8.5	11.0	11.2	11.5	10.5	9.6	9.7	10.2	5.8	4.1	8.5
(1953-1981)	Extreme	26	28	36	36	33	32	32	28	36	35	27	30	36
	Std. Dev.	4.1	5.4	6.3	6.1	5.6	5.0	4.4	4.5	5.4	6.2	4.9	4.4	
	Prev. Dir.	WNW	W	ESE	ESE	W	W	W	W	ESE	ESE	WNW	WNW	W
Whitehorse A	Mean	13.3	15.1	14.4	14.2	14.3	12.7	12.3	12.6	13.9	16.9	15.6	14.6	14.1
(1953-1981)	Extreme	43	41	41	35	40	34	32	32	35	41	41	44	44
	Std. Dev.	4.1	8.8	7.7	6.5	6.3	5.7	5.7	6.2	7.3	7.7	8.6	9.0	
	Prev. Dir.	SSE	SSE	SSE	SE	SE	SE	SE	SE	SSE	SSE	S	S	SSE

TABLE 7.2

Expected Annual Maximum Hourly Wind Speeds (km/h) for Various Return Periods

STATION	RETURN PERIOD (YRS.)						
	5	10	20	30	40	50	75
Aishihik (1953-1965)	84	93	103	108			
Burwash A (1967-1983)	87	98	109	115	120		
Dawson (1960-1975)	47	50	53	55	56		
Mayo A (1963-1983)	42	44	46	48	48		
Snag A (1953-1965)	56	62	69	72			
Teslin A (1953-1974)	57	62	68	71	73	75	
Watson Lake A (1953-1983)	63	69	74	77	79	81	84
Whitehorse A (1953-1983)	66	72	78	82	84	86	90

TABLE 7.3

Frequency of Specified Duration Lengths within Defined Conditions of Wind Speed

STATION: Aishihik A 01/1953 – 09/1966

MONTH	Km/h	RANGES (DAYS)							NUMBER OF DUR. EVENTS	EXTREME ELEMENT MAX.	LONGEST DURATION	% FREQ. OF COND.
		1 TO 6	7 TO 12	13 TO 24	25 TO 36	37 TO 48	49 TO 72	73 TO 999				
JANUARY	0-15	168	26	19	12	9	12	41	287		717	88
	16-29	310	41	6					357		23	10
	>29	85	6	3					94	80	15	2
FEBRUARY	0-15	254	43	45	25	10	21	21	419		285	78.5
	16-29	503	44	5					552		18	16.5
	>29	154	8	1					163	71	18	5.0
MARCH	0-15	293	43	61	14	43	22	22	498		229	80
	16-29	551	52	7	2				612		31	17
	>29	130	11						141	72	10	3
APRIL	0-15	325	49	148	11	31	19	6	589		161	71
	16-29	640	86	9	1				736		29	24
	>29	155	12	4					171	68	17	5
MAY	0-15	481	110	171	8	10	6	3	789		111	61
	16-29	868	108	26	1				1,003		36	32
	>29	203	25	5					233	64	19	7
JUNE	0-15	501	122	163	18	12	2	5	823		135	68
	16-29	868	81	20	1				970		35	28
	>29	152	8	1					161	71	15	4
JULY	0-15	410	116	176	29	14	5	5	755		118	70
	16-29	760	97	20					877		19	27
	>29	118	8	2					128	56	22	3
AUGUST	0-15	335	78	170	19	33	8	6	649		135	73
	16-29	692	74	13					779		20	23
	>29	149	18						167	72	12	4
SEPTEMBER	0-15	259	73	119	19	28	20	9	527		149	74
	16-29	620	62	11	1				694		27	21
	>29	187	16	2					205	77	16	5
OCTOBER	0-15	327	58	71	15	17	19	17	524		227	72
	16-29	632	62	10					704		16	21
	>29	224	18	3					245	77	21	7
NOVEMBER	0-15	226	29	55	16	10	10	26	372		322	83
	16-29	414	35	8					457		16	14
	>29	125	8	1	1				135	87	25	3
DECEMBER	0-15	205	22	21	12	6	16	35	317		366	84.5
	16-29	369	30	6					405		21	12.5
	>29	106	5		1				112	97	28	3.0

TABLE 7.4

Frequency of Specified Duration Lengths within Defined Conditions of Wind Speed

STATION: Beaver Creek 02/1969 – 12/1977

MONTH	Km/h	RANGES (DAYS)							NUMBER OF DUR. EVENTS	EXTREME ELEMENT MAX.	LONGEST DURATION	% FREQ. OF COND.
		1 TO 6	7 TO 12	13 TO 24	25 TO 36	37 TO 48	49 TO 72	73 TO 999				
JANUARY	0-15	1	1	1				6	9		1,542	99.5
	16-29	7	1						8	27	8	0.5
FEBRUARY	0-15	7			1	2		9	19		1,150	98.5
	16-29	13	1						14	23	12	1.5
MARCH	0-15	12	2	2		1	3	22	42		592	99
	16-29	33							33	23	4	1
APRIL	0-15	24	4	6	2	3	1	21	61	14	628	98
	16-29	53	3	1					57	23	13	2
MAY	0-15	20	1	13	5	8	6	31	84		476	98
	16-29	69	4						73	26	9	2
JUNE	0-15	5	1	13	4	4	6	34	67		483	98.5
	16-29	57							57	24	6	1.5
JULY	0-15	3		2		1	4	25	35		837	99.5
	16-29	23							23	19	2	0.5
AUGUST	0-15	9			1	4	3	12	29		1,327	99.5
	16-29	21							21	23	3	0.5
SEPTEMBER	0-15	11	1	2	2	4	2	15	37		1,613	98.5
	16-29	31							31	24	6	1.5
OCTOBER	0-15	6		2	1			11	20		1,167	99
	16-29	19							19	29	6	1
NOVEMBER	0-15	7		1	1	1		8	18		2,499	99
	16-29	13							13	26	6	1
	>29	1							1	48	1	<0.5
DECEMBER	0-15	2		1			1	9	13		498	99.5
	16-29	4		1					5	27	13	0.5

TABLE 7.5

Frequency of Specified Duration Lengths within Defined Conditions of Wind Speed

STATION: Burwash A 10/1966 – 12/1983

MONTH	Km/h	RANGES (DAYS)							NUMBER OF DUR. EVENTS	EXTREME ELEMENT MAX.	LONGEST DURATION	% FREQ. OF COND.
		1 TO 6	7 TO 12	13 TO 24	25 TO 36	37 TO 48	49 TO 72	73 TO 999				
JANUARY	0-15	330	42	48	33	20	16	38	527		333	81
	16-29	608	36	10	1				655		26	13
	>29	137	17	10			2		168	78	63	6
FEBRUARY	0-15	390	36	65	16	11	29	25	572		279	72
	16-29	673	61	13	2				749		26	19
	>29	193	23	12	2	2			232	90	43	9
MARCH	0-15	371	71	142	22	37	14	16	673		182	71
	16-29	806	75	15	4				900		33	22
	>29	227	21	7	1				256	71	32	7
APRIL	0-15	475	99	148	21	10	9	4	766		145	53
	16-29	1059	123	32	3	1			1,218		41	33
	>29	423	42	22	4				491	100	32	14
MAY	0-15	536	133	162	12	8	9	1	861		89	51
	16-29	1175	152	22	1				1,350		29	35
	>29	442	48	29	2	1			522	64	37	14
JUNE	0-15	628	162	149	21	10	9		979		72	58
	16-29	1121	115	46	2				1,284		26	34
	>29	320	27	6	1				354	70	34	8
JULY	0-15	642	155	161	22	18	8	4	1,010		124	63
	16-29	1106	121	35	4				1,266		35	32
	>29	259	13	4	1				277	56	27	5
AUGUST	0-15	505	121	150	31	25	10	4	846		112	61
	16-29	961	121	45	2	1			1,130		39	32
	>29	286	20	10	1		1		318	61	54	7
SEPTEMBER	0-15	461	97	137	26	21	10	5	757		109	57
	16-29	986	121	31	6	1			1,145		40	32
	>29	380	25	14	1	2			422	71	45	11
OCTOBER	0-15	559	99	112	30	20	13	9	842		180	56
	16-29	1071	105	32	2		1		1,211		59	30
	>29	353	32	26	10	1			422	91	37	14
NOVEMBER	0-15	458	71	78	28	19	31	27	712		321	71
	16-29	874	65	22					961		24	21
	>29	249	31	14	2	2			298	89	48	8
DECEMBER	0-15	339	50	51	27	21	20	41	549		281	78
	16-29	651	57	12					720		22	16
	>29	165	21	8	3				197	100	36	6

TABLE 7.6

Frequency of Specified Duration Lengths within Defined Conditions of Wind Speed

STATION: Dawson A 01/1953 – 12/1983

MONTH	Km/h	RANGES (DAYS) 1 TO 6	7 TO 12	13 TO 24	25 TO 36	37 TO 48	49 TO 72	73 TO 999	NUMBER OF DUR. EVENTS	EXTREME ELEMENT MAX.	LONGEST DURATION	% FREQ. OF COND.
JANUARY	0-15	991	191	15	10	2	12	54	1,275		1,565	95.0
	16-29	300	24	5					329		24	4.5
	>29	29							29	48	6	0.5
FEBRUARY	0-15	857	162	18	11	9	14	49	1,120		730	90
	16-29	336	33	11	7	2	1	1	391		82	9
	>29	76	7						83	51	10	1
MARCH	0-15	921	180	54	21	20	32	57	1,285		403	86
	16-29	517	52	28	11		1		609		52	13
	>29	89	4						93	42	11	1
APRIL	0-15	1090	184	112	42	40	50	46	,564		222	84
	16-29	821	56	31	9	1	1		919		54	15
	>29	119	9						128	48	12	1
MAY	0-15	1296	218	247	70	55	30	28	1,944		167	87.0
	16-29	1156	34	8	2	1			1,201		42	12.5
	>29	66							66	42	6	0.5
JUNE	0-15	1077	195	205	47	68	55	34	1,681		289	92.0
	16-29	853	17	1					871		13	7.5
	>29	40							40	51	4	0.5
JULY	0-15	978	187	149	51	61	42	54	1,522		382	94.5
	16-29	640	16						656		12	5.5
	>29	19							19	42	2	<0.5
AUGUST	0-15	1003	204	107	28	36	28	89	1,495		312	95.5
	16-29	517	7	2					526		14	4.5
	>29	16							16	39	1	<0.5
SEPTEMBER	0-15	1050	205	72	33	24	40	70	1,494		324	93
	16-29	568	28	7	2	1			606		41	7
	>29	19							19	39	2	<0.5
OCTOBER	0-15	1122	189	39	35	28	21	62	1,496		2,013	87
	16-29	640	60	35	4	3			742		45	12
	>29	59	2	1					62	42	14	1
NOVEMBER	0-15	909	196	10	14	17	17	61	1,224		1,666	92.0
	16-29	376	40	13	4	2			435		38	7.5
	>29	43	2						45	48	11	0.5
DECEMBER	0-15	892	180	15	13	11	18	58	1,187		834	92.5
	16-29	387	25	12	4	1	1		430		51	6.5
	>29	55	3						58	48	12	1.0

TABLE 7.7

Frequency of Specified Duration Lengths within Defined Conditions of Wind Speed

STATION: Faro 02 1972 10 1977

MONTH	Km/h	RANGES (DAYS) 1 TO 6	7 TO 12	13 TO 24	25 TO 36	37 TO 48	49 TO 72	73 TO 999	NUMBER OF DUR. EVENTS	EXTREME ELEMENT MAX.	LONGEST DURATION	% FREQ. OF COND.
JANUARY	0-15	27	7	10	7	6	4	11	72		254	91
	16-29	57	6	2		1			66		37	9
	>29	4							4	35	2	<0.5
FEBRUARY	0-15	48	12	12	7	5	6	11	101		269	86
	16-29	72	13	6	2				93		32	14
	>29	2							2	39	5	<0.5
MARCH	0-15	69	24	32	13	18	7	4	167		164	84
	16-29	117	19	5	1				142		25	16
	>29	4							4	32	4	<0.5
APRIL	0-15	117	18	64	11	16	7	4	237		131	81
	16-29	197	31	5	1				234		36	19
	>29	4							4	32	1	<0.5
MAY	0-15	119	28	84	13	12	5	2	263		89	78.5
	16-29	224	33	9					266		17	21.5
	>29	5							5	32	3	<0.5
JUNE	0-15	113	29	74	17	5	7	4	249		100	81.5
	16-29	212	26	5					243		18	18.5
	>29	4							4	32	1	<0.5
JULY	0-15	74	16	61	12	8	7	1	179		99	84.5
	16-29	150	14	5					169		20	15.5
	>29	2							2	37	4	<0.5
AUGUST	0-15	50	7	35	8	10	7	6	123		231	90.5
	16-29	114	5						119	29	12	9.5
SEPTEMBER	0-15	67	16	35	7	20	14	8	167		164	89
	16-29	141	14	2					157		17	11
	>29	4							4	31	1	<0.5
OCTOBER	0-15	91	14	30	17	7	16	8	183		187	86
	16-29	154	18	5					177		24	14
	>29	2							2	32	1	< 0.5
NOVEMBER	0-15	65	9	9	9	6	1	15	114		423	88
	16-29	89	14	6	1				110		35	12
	>29	5							5	34	1	<0.5
DECEMBER	0-15	48	9	5	5	4	4	9	84		221	86
	16-29	72	13	2					87		21	13
	>29	10							10	40	3	1

TABLE 7.8

Frequency of Specified Duration Lengths within Defined Conditions of Wind Speed

STATION: Haines Junction 01/1963 – 09/1983

MONTH	Km/h	RANGES (DAYS)							NUMBER OF DUR. EVENTS	EXTREME ELEMENT MAX.	LONGEST DURATION	% FREQ. OF COND.
		1 TO 6	7 TO 12	13 TO 24	25 TO 36	37 TO 48	49 TO 72	73 TO 999				
JANUARY	0-15	73	18	16	7	11	11	41	177		638	94.5
	16-29	145	22	4	1				172		28	5.5
	>29	14							14	48	5	<0.5
FEBRARY	0-15	117	14	28	12	11	20	44	246		392	93
	16-29	213	25	9	1				248		31	7
	>29	15							15	51	5	<0.5
MARCH	0-15	103	28	35	20	29	22	41	278		375	91.0
	16-29	241	20	17	2				280		29	8.5
	>29	11	1		1				13	42	25	0.5
APRIL	0-15	155	29	133	25	41	34	35	452		237	87.5
	16-29	389	60	7	2				458		31	12.0
	>29	16	2	1					19	63	13	0.5
MAY	0-15	170	51	336	18	48	17	8	648		139	80
	16-29	498	162	2					662		24	20
	>29	29							29	45	5	<0.5
JUNE	0-15	167	47	272	21	42	23	9	581		145	79.5
	16-29	444	143	10	1				598		33	20.0
	>29	33	1						34	35	8	0.5
JULY	0-15	94	23	199	14	53	28	23	434		185	86
	16-29	320	101	1					422		13	14
	>29	7							7	39	2	<0.5
AUGUST	0-15	101	22	130	19	29	30	46	377		329	90.5
	16-29	305	60						365		12	9.5
	>29	6							6	34	2	<0.5
SEPTEMBER	0-15	116	18	44	19	17	29	52	295		535	93.5
	16-29	249	21	3					273		24	6.5
	>29	2							2	40	2	<0.5
OCTOBER	0-15	99	20	26	13	21	19	58	256		512	94.5
	16-29	221	19	11					251		23	5.5
	>29	8							8	48	4	<0.5
NOVEMBER	0-15	82	10	15	11	5	20	47	190		1,107	94.5
	16-29	168	14	9					191		19	5.0
	>29	10	2						12	58	10	0.5
DECEMBER	0-15	98	15	18	10	7	14	40	202		1,033	93.5
	16-29	189	17	8					214		24	6.0
	>29	16	1						17	45	10	0.5

TABLE 7.9

Frequency of Specified Duration Lengths within Defined Conditions of Wind Speed

STATION: Kluane Lake 06/1974 – 08/1980

MONTH	Km/h	RANGES (DAYS)							NUMBER OF DUR. EVENTS	EXTREME ELEMENT MAX.	LONGEST DURATION	% FREQ. OF COND.
		1 TO 6	7 TO 12	13 TO 24	25 TO 36	37 TO 48	49 TO 72	73 TO 999				
JANUARY	0-15	45	10	10	6	3	13	14	101		368	92
	16-29	94	8	1					103		14	6
	>29	16	2	1	1				20	47	25	2
FEBRUARY	0-15	48	10	17	8	4	3	9	99		353	87
	16-29	104	3	5	1				113		26	11
	>29	20	2	1					23	50	14	2
MARCH	0-15	56	22	50	10	8	10	2	158		138	85.5
	16-29	134	10	4					148		22	14.0
	>29	3	1						4	40	9	0.5
APRIL	0-15	60	21	60	6	9	6	3	165		97	83
	16-29	163	10	2					175		18	15
	>29	18	1	1					20	48	16	2
MAY	0-15	60	19	66	9	15	4	5	178		262	88
	16-29	149	12	1					162		13	12
	>29	4							4	35	3	<0.5
JUNE	0-15	114	42	65	20	16	10	3	270		90	87.5
	16-29	234	7						241		12	12.5
	>29	5							5	35	4	<0.5
JULY	0-15	89	31	72	19	15	15	6	247		109	91
	16-29	224	2	1					227		13	9
	>29	3							3	39	2	<0.5
AUGUST	0-15	75	23	54	12	16	8	10	198		160	86.5
	16-29	184	12	5					201		22	12.0
	>29	13	2	1					16	40	14	1.5
SEPTEMBER	0-15	40	17	23	9	10	9	9	117		162	84
	16-29	118	7	7	1				133		32	13
	>29	16	1	3					20	50	23	3
OCTOBER	0-15	67	25	38	11	9	7	6	163		167	84
	16-29	151	13	3					167		17	14
	>29	18			1				19	45	29	2
NOVEMBER	0-15	63	23	25	14	6	5	9	145		195	79
	16-29	155	15	6					176		18	16
	>29	30	7	3					40	45	19	5
DECEMBER	0-15	46	13	14	12	9	4	18	116		311	87
	16-29	107	15	1					123		17	9
	>29	18	3	1	1	1			24	87	43	4

TABLE 7.10

Frequency of Specified Duration Lengths within Defined Conditions of Wind Speed

STATION: Komakuk Beach A 09/1973 – 09/1983

MONTH	Km/h	RANGES (DAYS)							NUMBER OF DUR. EVENTS	EXTREME ELEMENT MAX.	LONGEST DURATION	% FREQ. OF COND.
		1 TO 6	7 TO 12	13 TO 24	25 TO 36	37 TO 48	49 TO 72	73 TO 999				
JANUARY	0-15	105	40	21	8	8	2	1	185		97	33
	16-29	257	44	17	4	1			323		42	27
	>29	91	20	19	7	13	2	4	156	84	246	40
FEBRUARY	0-15	141	33	25	16	1	1	3	220		102	40
	16-29	255	54	19	3	1			332		42	33
	>29	75	32	27	8	1	1		144	87	49	27
MARCH	0-15	99	24	35	8	6	3	2	177		107	39
	16-29	213	51	25	3		1		293		53	30
	>29	88	18	10	6	4	8	2	136	85	109	31
APRIL	0-15	99	40	36	6	6	3		190		63	43
	16-29	211	44	16	4	2			277		38	32
	>29	52	18	12	6	3	2	1	94	71	170	25
MAY	0-15	89	27	36	13	7	4	1	177		106	41
	16-29	206	45	32	5	1			289		41	33
	>29	79	16	13	8	4	4	1	125	68	159	26
JUNE	0-15	71	30	27	7	3	2		140		56	40
	16-29	153	47	23	5				228		32	38
	>29	61	4	20		3	1	1	90	61	81	22
JULY	0-15	104	46	34	15	7	4	2	212		76	49
	16-29	250	47	28	5	1			331		48	36
	>29	82	15	20	2	1			120	53	40	15
AUGUST	0-15	107	49	44	20	6	4	3	233		114	56
	16-29	238	57	21	1	1			318		39	30
	>29	61	18	11	1	1	1	1	94	66	73	14
SEPTEMBER	0-15	146	52	57	34	11	7	2	309		94	54
	16-29	318	77	34	7	2			438		46	32
	>29	90	22	17	6	3	1		139	56	57	14
OCTOBER	0-15	110	30	34	14	5	8	2	203		80	44
	16-29	230	56	23	3		1		313		54	29
	>29	74	13	23	8	5	3	1	127	76	127	27
NOVEMBER	0-15	89	35	19	14	3	3	1	164		81	36
	16-29	230	38	16	4	1			289		45	29
	>29	77	12	25	3	7	6	2	132	79	87	35
DECEMBER	0-15	99	24	23	5	9	4	2	166		123	42
	16-29	230	37	13	3	2			285		46	27
	>29	77	14	19	9	3	4	2	128	89	86	31

TABLE 7.11

Frequency of Specified Duration Lengths within Defined Conditions of Wind Speed

STATION: Mayo A 01/1953 12/1983

MONTH	Km/h	RANGES (DAYS)							NUMBER OF DUR. EVENTS	EXTREME ELEMENT MAX.	LONGEST DURATION	% FREQ. OF COND.
		1 TO 6	7 TO 12	13 TO 24	25 TO 36	37 TO 48	49 TO 72	73 TO 999				
JANUARY	0-15	1438	218	385	8	5	11	18	2,083		389	93
	16-29	372	23	9					404		19	7
	>29	20							20	42	3	<0.5
FEBRUARY	0-15	1409	225	299	12	6	8	16	1,975		608	87
	16-29	616	56	21	1				694		28	13
	>29	36							36	43	5	<0.5
MARCH	0-15	1808	295	282	17	14	13	12	2,441		135	79
	16-29	1193	75	24	1				1,293		32	20
	>29	67							67	42	5	1
APRIL	0-15	1790	302	273	23	28	17	7	2,440		172	82.5
	16-29	1199	64	10					1,273		24	17.0
	>29	43	1						44	56	7	0.5
MAY	0-15	1906	303	279	37	19	21	10	2,575		163	85
	16-29	1243	43	13					1,299		23	15
	>29	27							27	42	4	<0.5
JUNE	0-15	1547	289	254	22	33	24	29	2,198		280	93
	16-29	761	14						775		12	7
	>29	14							14	64	2	<0.5
JULY	0-15	1474	271	244	15	20	22	42	2,088		274	94
	16-29	598	10	1					609		14	6
	>29	6							6	42	1	<0.5
AUGUST	0-15	1384	280	255	19	11	18	38	2,005		490	95
	16-29	495	14	1					510		14	5
	>29	5							5	35	1	<0.5
SEPTEMBER	0-15	1511	252	229	20	22	27	29	2,090		298	91
	16-29	714	27	3					744		19	9
	>29	20							20	43	5	<0.5
OCTOBER	0-15	1756	257	294	26	12	11	15	2,371		171	83.0
	16-29	1029	50	15	1				1,095		33	16.5
	>29	41							41	72	5	0.5
NOVEMBER	0-15	1473	208	332	15	5	7	33	2,073		799	91
	16-29	704	36	13					753		21	9
	>29	10							10	43	2	<0.5
DECEMBER	0-15	1419	209	349	6	4	6	22	2,015		679	91
	16-29	462	39	11	1	1			514		37	9
	>29	37							37	45	4	<0.5

TABLE 7.12

Frequency of Specified Duration Lengths within Defined Conditions of Wind Speed

STATION: Old Crow 12/1974 – 12/1976

MONTH	Km/h	RANGES (DAYS)							NUMBER OF DUR. EVENTS	EXTREME ELEMENT MAX.	LONGEST DURATION	% FREQ. OF COND.
		1 TO 6	7 TO 12	13 TO 24	25 TO 36	37 TO 48	49 TO 72	73 TO 999				
JANUARY	0-15	7	2					5	14		289	93.5
	16-29	12	5						17		8	6.0
	>29	3							3	34	3	0.5
FEBRUARY	0-15	5	1	2	1	1	3	1	14		462	87
	16-29	10	1	2		1			14		47	13
MARCH	0-15	4		2	1			2	9		165	96
	16-29	7							7	18	4	4
APRIL	0-15	30	5	13	1	3	2	2	56		158	78.5
	16-29	42	7	5					54		20	21.0
	>29	2							2	32	3	0.5
MAY	0-15	25	7	9	1	2	1	2	47		127	68
	16-29	40	6	4		1	1		52		56	31
	>29	6	1						7	37	8	1
JUNE	0-15	19	3	8	1	1	1	2	35		110	79
	16-29	30	5	1					36		15	20
	>29	2							2	34	3	1
JULY	0-15	27	10	7	3	1	1		49		51	66
	16-29	36	12	3					51		19	33
	>29	4							4	32	2	1
AUGUST			MISSING DATA									
SEPTEMBER	0-15	10	1	9	1	3	4		28		65	79
	16-29	23	4	1					28		16	17
	>29	3		1					4	39	16	4
OCTOBER	0-15	26	1	6	2	1	1	2	39		239	78
	16-29	29	7	1	1				38		29	22
	>29	2							2	32	1	<0.5
NOVEMBER	0-15	24	5	5	1	5	1	4	45		208	82.0
	16-29	33	8	5					46		22	18.0
	>29	2							2	31	1	<0.5
DECEMBER	0-15	31	6	9	1	2	4	9	62		274	84
	16-29	51	8	6	1				66		31	14
	>29	15	1						16	43	7	2

TABLE 7.13

Frequency of Specified Duration Lengths within Defined Conditions of Wind Speed

STATION: Shingle Point A 09/1973 – 09/1983

MONTH	KM/HR	RANGES (DAYS)							NUMBER OF DUR. EVENTS	EXTREME ELEMENT MAX.	LONGEST DURATION	% FREQ. OF COND.
		1 TO 6	7 TO 12	13 TO 24	25 TO 36	37 TO 48	49 TO 72	73 TO 999				
JANUARY	0-15	123	27	27	8	5	4	1	195		82	45
	16-29	259	45	7	3				314		35	30
	>29	104	13	13	8	3	1		142	97	62	25
FEBRUARY	0-15	82	12	18	8	7	3	1	131		99	45
	16-29	152	28	8	3	1			192		45	26
	>29	42	15	9	5	2	4	1	78	97	73	29
MARCH	0-15	97	16	17	13	9	7	4	163		178	64
	16-29	148	38	10	3		2		201		55	28
	>29	27	8	4	2	1			42	69	40	8
APRIL	0-15	88	17	16	14	6	7	7	155		139	70
	16-29	138	23	13					174		24	22
	>29	19	6	4		1	1		31	82	50	8
MAY	0-15	108	17	33	8	8	5	8	187		139	72.5
	16-29	165	25	8	3	2			203		44	26.5
	>29	16		1					17	63	19	1.0
JUNE	0-15	127	43	41	5	4	2		222		65	51
	16-29	181	49	32	2	1	1		266		50	45
	>29	41	4	2					47	51	14	4
JULY	0-15	122	38	46	8	3			217		42	50
	16-29	201	53	15	1	1	1		272		49	39
	>29	42	12	8		1			63	60	38	11
AUGUST	0-15	162	49	40	9	2		1	263		86	49
	16-29	272	48	20	1		1		342		49	40
	>29	66	10	6	2	1			85	58	43	11
SEPTEMBER	0-15	183	41	51	20	10	3		308		68	49
	16-29	332	73	28	6	1	1		441		52	38
	>29	109	18	12	2		2		143	63	64	13
OCTOBER	0-15	124	42	31	17	9	6	1	230		80	49
	16-29	259	51	24	5		1		340		65	33
	>29	77	8	19	5	4	1		114	84	64	18
NOVEMBER	0-15	134	25	21	8	3	4	3	198		107	38
	16-29	217	38	22	5				282		30	31
	>29	52	12	6	7	5	7	3	92	92	124	31
DECEMBER	0-15	112	30	21	12	7	9	1	192		208	55
	16-29	212	39	11	4				266		35	27
	>29	59	8	10	4	1	3		85	108	66	18

TABLE 7.14

Frequency of Specified Duration Lengths within Defined Conditions of Wind Speed

STATION: Snag A 01/1953 – 09/1966

MONTH	Km/h	RANGES (DAYS)							NUMBER OF DUR. EVENTS	EXTREME ELEMENT MAX.	LONGEST DURATION	% FREQ. OF COND.
		1 TO 6	7 TO 12	13 TO 24	25 TO 36	37 TO 48	49 TO 72	73 TO 999				
JANUARY	0-15	35	7	1	1	6	4	21	75	14	1,023	96.0
	16-29	70	5	5					80	29	20	3.5
	>29	7	1						8	51	9	0.5
FEBRUARY	0-15	58	13	12	7	3	7	33	133	14	784	93.5
	16-29	132	11	6	1				150	29	27	6.0
	>29	22							22	45	4	0.5
MARCH	0-15	165	25	41	11	18	15	42	317	14	435	90.0
	16-29	302	22	8					332	29	20	9.5
	>29	20							20	43	6	0.5
APRIL	0-15	227	39	90	31	16	26	20	449	14	228	84
	16-29	438	40	11					489	29	23	15
	>29	42	2						44	68	8	1
MAY	0-15	341	44	193	32	27	21	9	667	14	107	85.0
	16-29	651	29	5					685	29	17	14.5
	>29	28							28	42	6	0.5
JUNE	0-15	267	49	185	33	32	22	7	595	14	97	86.0
	16-29	580	21	6					607	29	22	13.5
	>29	30							30	51	5	0.5
JULY	0-15	190	38	117	33	34	33	21	466	14	233	90.0
	16-29	452	17	2					471	29	18	9.0
	>29	12							12	61	2	1.0
AUGUST	0-15	179	18	80	27	35	32	28	399	14	389	92.5
	16-29	394	11	1					406	29	14	7.0
	>29	13							13	55	4	0.5
SEPTEMBER	0-15	137	16	52	20	19	19	39	302	14	398	91.0
	16-29	292	24	4					320	29	15	8.5
	>29	24							24	45	6	0.5
OCTOBER	0-15	128	23	21	6	9	15	40	242	14	643	93.5
	16-29	220	23	7					250	29	20	6.5
	>29	11							11	48	3	0
NOVEMBER	0-15	52	4	13	6	2	6	28	111	14	1,722	97
	16-29	102	6	5	1				114	29	28	3
	>29	6							6	40	4	0
DECEMBER	0-15	37	2	7	1	3	2	22	74	14	1,178	97
	16-29	69	4	6					79	29	19	3
	>29	5							5	48	3	0

TABLE 7.15

Frequency of Specified Duration Lengths within Defined Conditions of Wind Speed

STATION: Teslin A 01/1953 – 10/1982

MONTH	Km/h	RANGES (DAYS)							NUMBER OF DUR. EVENTS	EXTREME ELEMENT MAX.	LONGEST DURATION	% FREQ. OF COND.
		1 TO 6	7 TO 12	13 TO 24	25 TO 36	37 TO 48	49 TO 72	73 TO 999				
JANUARY	0-15	366	107	140	24	18	28	62	745	15	531	91
	16-29	586	32	15					633	29	24	8
	>29	50							50	48	5	1
FEBRUARY	0-15	567	129	153	29	26	30	48	982	15	411	86
	16-29	831	56	13					900	29	24	13
	>29	76	1						77	48	7	1
MARCH	0-15	680	179	167	36	49	44	33	1,188	15	234	83
	16-29	1034	76	12					1,122	29	24	16
	>29	95	1						96	45	7	1
APRIL	0-15	798	152	308	33	50	24	14	1,379	15	160	79
	16-29	1235	119	8					1,362	29	19	20
	>29	112	3						115	48	9	1
MAY	0-15	932	184	344	33	56	23	7	1,579	15	169	78
	16-29	1395	122	15					1,532	29	15	21
	>29	78							78	48	6	1
JUNE	0-15	816	224	277	38	53	28	9	1,445	15	118	80
	16-29	1275	93	16					1,389	29	20	19
	>29	71	1						72	45	8	1
JULY	0-15	739	239	311	50	44	36	9	1,428	15	115	83.0
	16-29	1212	84	8					1,304	29	20	16.5
	>29	63							63	42	5	0.5
AUGUST	0-15	621	177	316	41	63	26	20	1,264	15	231	86.0
	16-29	1047	58	6					1,111	29	14	13.5
	>29	39	1						40	46	7	0.5
SEPTEMBER	0-15	657	136	218	32	40	34	28	1,145	15	313	84.0
	16-29	958	79	9					1,046	29	18	15.5
	>29	65							65	64	6	0.5
OCTOBER	0-15	916	160	198	52	38	40	21	1,425	15	185	79
	16-29	1293	73	17	1				1,384	29	25	20
	>29	108	2						110	58	8	1
NOVEMBER	0-15	696	149	166	65	29	37	37	1,179	15	252	84.0
	16-29	1037	54	15	1				1,107	29	30	15.5
	>29	60							60	71	6	0.5
DECEMBER	0-15	425	114	148	26	23	34	53	823	15	511	88.5
	16-29	655	53	20	2				730	29	28	11.0
	>29	55	2						57	64	8	0.5

TABLE 7.16
Frequency of Specified Duration Lengths within Defined Conditions of Wind Speed

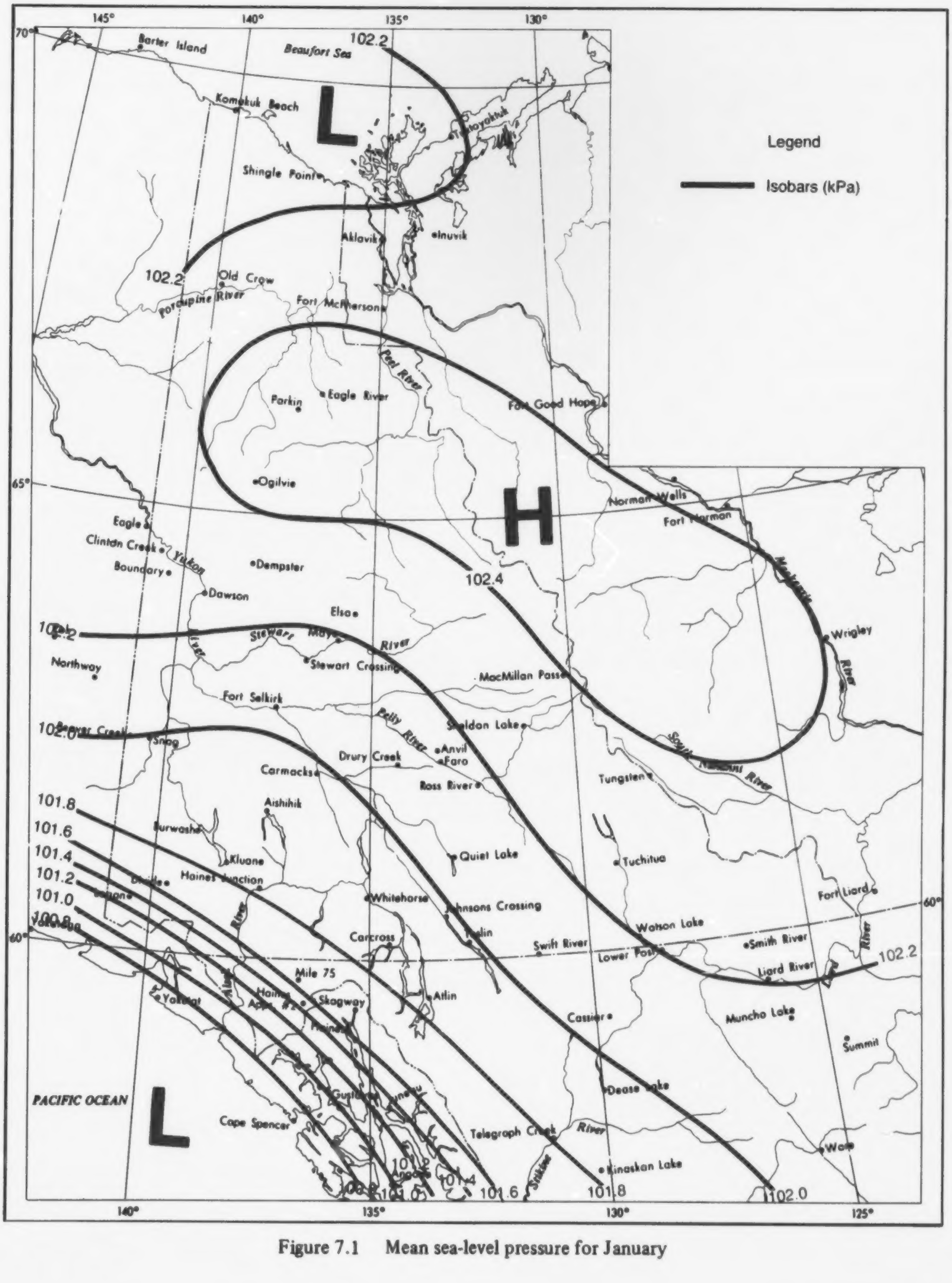
STATION: Watson Lake A 01/1953 – 12/1983

MONTH	Km/h	RANGES (DAYS)							NUMBER OF DUR. EVENTS	EXTREME ELEMENT MAX.	LONGEST DURATION	% FREQ. OF COND.
		1 TO 6	7 TO 12	13 TO 24	25 TO 36	37 TO 48	49 TO 72	73 TO 999				
JANUARY	0-15	133	17	23	14	11	17	77	292	15	1,218	95
	16-29	290	33	6	1				330	29	29	4.5
	>29	50	1						51	48	8	0.5
FEBRUARY	0-15	282	57	61	22	21	29	77	549	15	392	88.0
	16-29	577	57	18					652	29	23	10.5
	>29	125	6	1					132	64	15	1.5
MARCH	0-15	573	95	186	49	67	45	41	1,056	15	214	78
	16-29	1129	119	34	1		1		1,284	29	50	19
	>29	246	21	2					269	61	21	3
APRIL	0-15	935	181	341	58	50	22	9	1,596	15	146	70
	16-29	1763	159	41	2				1,965	29	31	26
	>29	404	26	2					432	64	17	4
MAY	0-15	1115	218	394	53	46	15	3	1,844	15	144	69
	16-29	1996	159	34	3				2,192	29	34	27
	>29	448	13	4					465	80	17	4
JUNE	0-15	1219	240	380	63	31	15	1	1,949	15	75	71
	16-29	2032	152	22	1				2,207	29	29	26
	>29	379	10	2					391	64	14	3
JULY	0-15	1141	242	376	52	49	29	7	1,896	15	115	74
	16-29	1931	136	24					2,091	29	22	24
	>29	270	6						276	48	9	2
AUGUST	0-15	929	167	358	62	61	33	18	1,628	15	187	78
	16-29	1657	118	19					1,794	29	23	20
	>29	217	8						225	48	10	2
SEPTEMBER	0-15	703	138	243	74	65	30	31	1,284	15	343	79
	16-29	1366	99	25	2				1,492	29	27	19
	>29	262	11	2					275	64	19	2
OCTOBER	0-15	739	152	156	59	53	43	48	1,250	15	535	78
	16-29	1384	114	31	3	1			1,533	29	40	19
	>29	316	18	2					336	80	16	3
NOVEMBER	0-15	296	43	47	28	13	18	89	534	15	617	92
	16-29	543	57	10	1				611	29	26	7
	>29	84	8	1					93	61	13	1
DECEMBER	0-15	141	17	19	14	9	7	69	276	15	839	95
	16-29	292	32	5	1				330	29	26	4
	>29	62	4						66	56	12	1

TABLE 7.17
Frequency of Specified Duration Lengths within Defined Conditions of Wind Speed

STATION: Whitehorse A 01/1953 – 12/1983

MONTH	Km/h	RANGES (DAYS)							NUMBER OF DUR. EVENTS	EXTREME ELEMENT MAX.	LONGEST DURATION	% FREQ. OF COND.
		1 TO 6	7 TO 12	13 TO 24	25 TO 36	37 TO 48	49 TO 72	73 TO 999				
JANUARY	0-15	793	93	97	60	36	47	33	1,159	15	228	63
	16-29	1573	177	63	8	3			1,824	29	39	28
	>29	685	55	20	4				764	72	30	9
FEBRUARY	0-15	888	113	106	43	39	27	22	1,238	15	289	55
	16-29	1722	203	68	13	1			2,007	29	41	34
	>29	792	43	23	2				860	68	28	11
MARCH	0-15	1105	138	193	49	38	25	13	1,561	15	140	56
	16-29	1808	280	103	4	1	1		2,197	29	65	37
	>29	647	24	4	2	1			678	64	47	7
APRIL	0-15	1359	180	253	41	34	9	5	1,881	15	138	56
	16-29	2010	260	92	11	2	1		2,376	29	56	39
	>29	538	13	2					553	60	15	5
MAY	0-15	1569	206	282	39	28	6	2	2,132	15	101	62
	16-29	2199	281	101	10				2,591	29	35	44
	>29	497	11	3					511	64	16	4
JUNE	0-15	1421	236	305	41	31	11	5	2,050	15	117	64
	16-29	2036	211	76	8				2,331	29	31	34
	>29	346	6						352	56	9	2
JULY	0-15	1359	229	295	47	38	21	9	1,998	15	185	66
	16-29	1931	226	74	5	2			2,238	29	43	32
	>29	262	3	1					266	63	13	2
AUGUST	0-15	1306	152	254	60	46	27	10	1,855	15	313	64
	16-29	1805	253	86	8	4			2,156	29	45	34
	>29	346	11						357	48	11	2
SEPTEMBER	0-15	1117	132	172	54	49	21	9	1,554	15	185	56
	16-29	1624	290	119	11	1	1		2,046	29	52	39
	>29	527	17	1					545	72	14	5
OCTOBER	0-15	1339	134	136	44	30	18	8	1,709	15	116	45
	16-29	2012	365	131	12	2	1		2,523	29	53	47
	>29	849	39	7					895	63	20	8
NOVEMBER	0-15	1026	113	99	58	30	32	20	1,378	15	209	52
	16-29	1829	272	100	13	2			2,216	29	46	38
	>29	854	53	20					927	68	20	10
DECEMBER	0-15	885	114	113	50	32	37	36	1,267	15	183	57
	16-29	1730	192	99	10				2,031	29	31	33
	>29	764	54	24	1				843	72	27	10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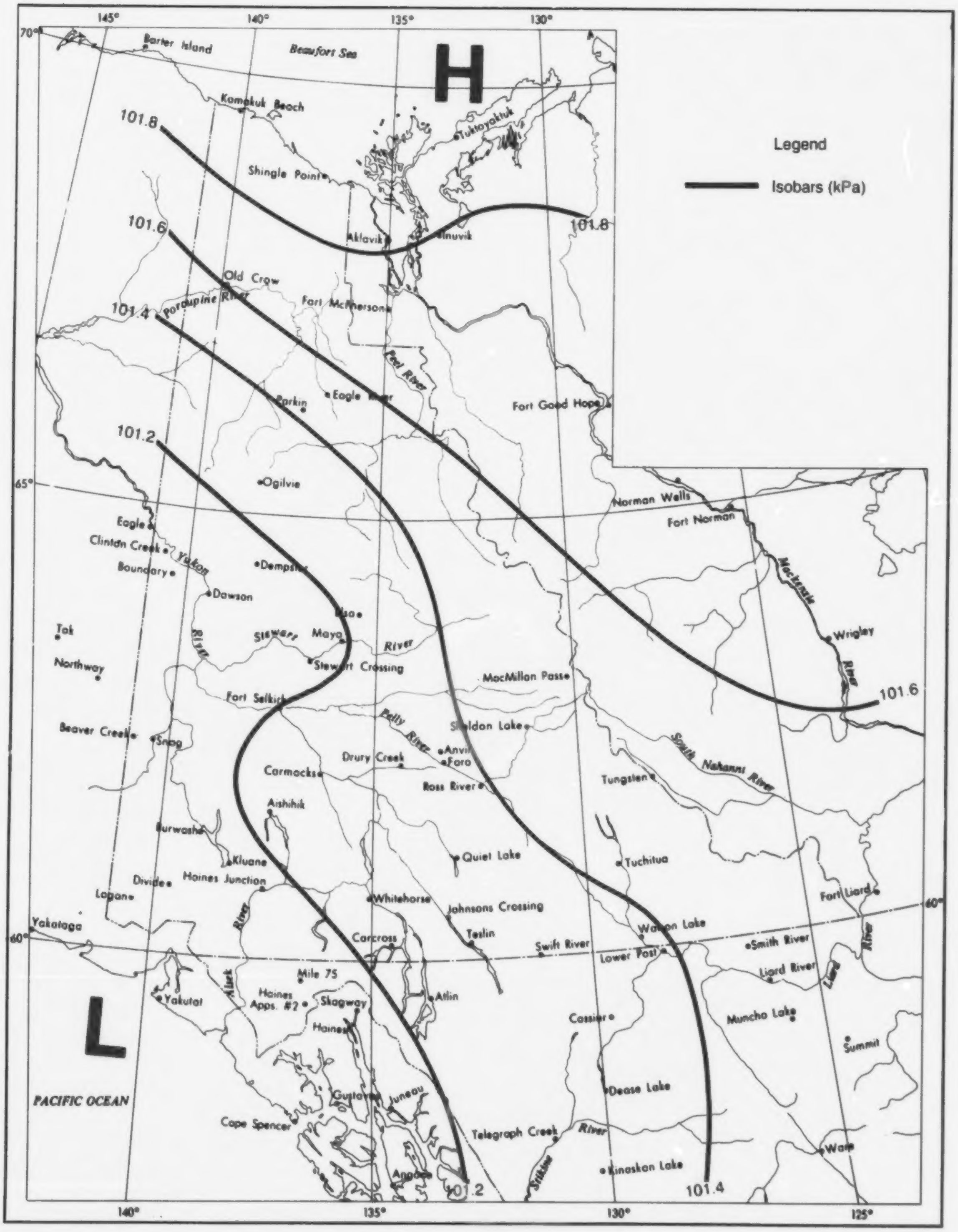
Beaufort Sea
Barter Island
Komakuk Beach
Shingle Point
Tuktoyaktuk
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Mackenzie River
Eagle
Clinton Creek
Boundary
Yukon
Dawson
Dempster
Elsa
Mayo
Stewart River
Stewart Crossing
Northway
MacMillan Pass
Wrigley
Fort Selkirk
Pelly River
Sheldon Lake
Anvil
Faro
Drury Creek
Carmacks
Beaver Creek
Snag
Ross River
Aishihik
Tungsten
South Nahanni River
Burwash
Kluane
Quiet Lake
Tuchitua
Haines Junction
Whitehorse
Johnsons Crossing
Fort Liard
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Carcross
Mile 75
Atlin
Haines Apt.
Skagway
Yakutat
Cassiar
Muncho Lake
Summit
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
Stikine River
Kinaskan Lake
Ware
145°
140°
135°
130°
125°
70°
65°
60°

Figure 7.1 Mean sea-level pressure for January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Isobars (kPa)
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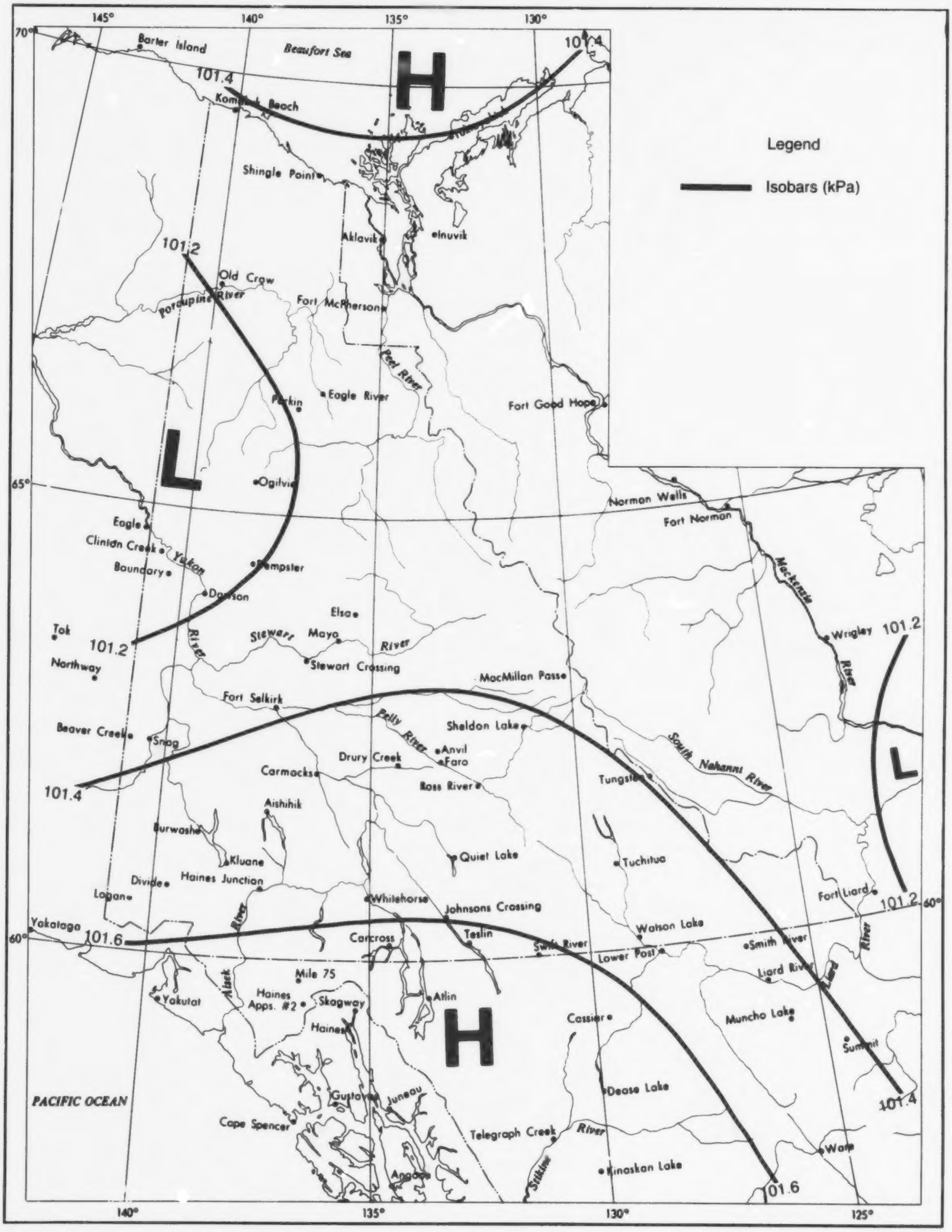
Beaufort Sea
PACIFIC OCEAN
Barter Island
Komakuk Beach
Shingle Point
Tuktoyaktuk
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Eagle River
Parkin
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Mackenzie River
Eagle
Clinton Creek
Yukon
Boundary
Dempster
Dawson
Elsa
Mayo
Stewart River
Stewart Crossing
Tok
Northway
Wrigley
MacMillan Pass
Fort Selkirk
Pelly River
Sheldon Lake
Beaver Creek
Snag
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
South Nahanni River
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Logan
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Teslin
Carcross
Watson Lake
Swift River
Lower Post
Smith River
Liard River
Mile 75
Yakutat
Alsek River
Haines Apps. #2
Skagway
Atlin
Haines
Cassiar
Muncho Lake
Summit
Dease Lake
Gustavus
Juneau
Cape Spencer
Telegraph Creek
Stikine River
Kinaskan Lake
Angoon
Ware

Figure 7.2 Mean sea-level pressure for April


145°
140°
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Isobars (kPa)
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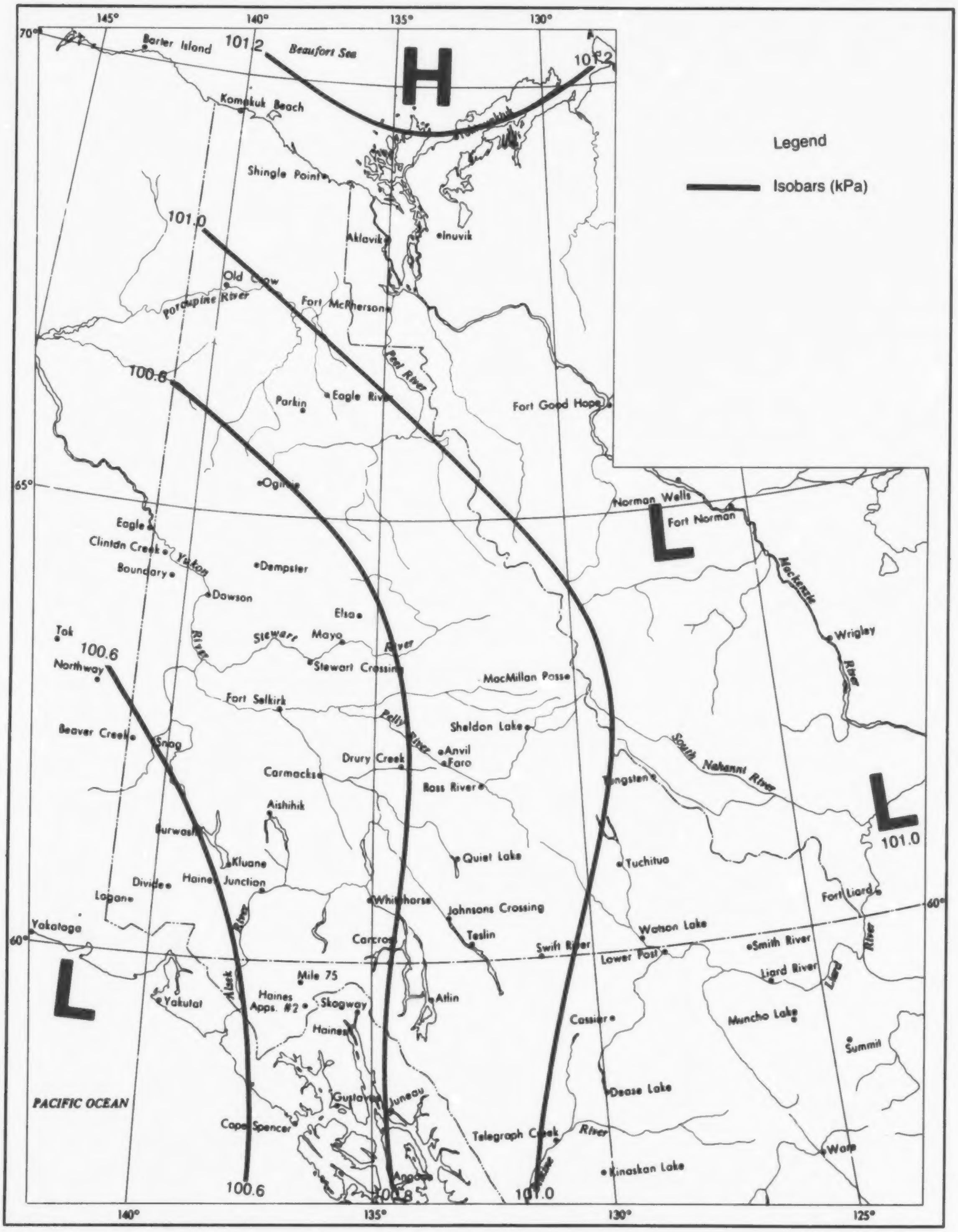
Barter Island
Beaufort Sea
Komakuk Beach
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Eagle River
Parkin
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Yukon River
Dempster
Dawson
Mackenzie River
Tok
Northway
Elsa
Mayo
Stewart River
Stewart Crossing
Wrigley
MacMillan Pass
Fort Selkirk
Pelly River
Beaver Creek
Snag
Sheldon Lake
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
South Nahanni River
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Logan
Fort Liard
Whitehorse
Johnsons Crossing
Yakataga
Alsek River
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Mile 75
Haines Apps. #2
Skagway
Atlin
Yakutat
Haines
Cassiar
Muncho Lake
Summit
PACIFIC OCEAN
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
Stikine River
Ware
Angoon
Kinaskan Lake

Figure 7.3 Mean sea-level pressure for July


145°
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Isobars (kPa)
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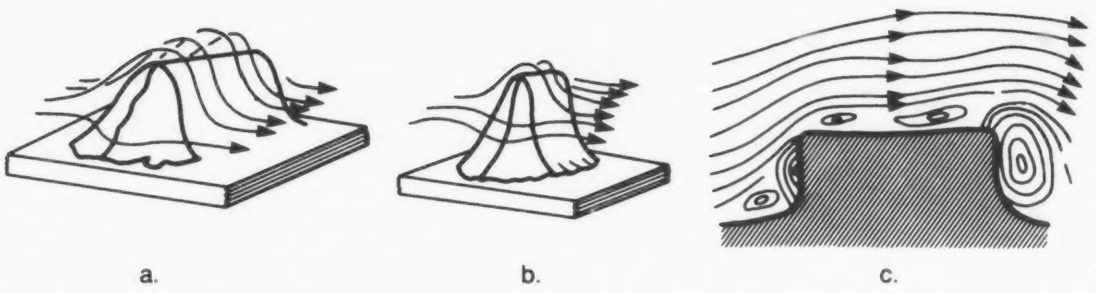
Beaufort Sea
Barter Island
Komakuk Beach
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Eagle River
Parkin
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Yukon River
Dempster
Dawson
Mackenzie River
Elsa
Mayo
Stewart River
Stewart Crossing
Wrigley
Tok
Northway
MacMillan Pass
Fort Selkirk
Pelly River
Sheldon Lake
Anvil
Faro
Beaver Creek
Snag
Drury Creek
Carmacks
Ross River
South Nahanni River
Tungsten
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Logan
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Teslin
Swift River
Watson Lake
Smith River
Carcross
Lower Post
Liard River
Mile 75
Haines Apps. #2
Skagway
Atlin
Yakutat
Alsek River
Haines
Cassiar
Muncho Lake
Summit
Gustavus
Juneau
Dease Lake
PACIFIC OCEAN
Cape Spencer
Telegraph Creek
Stikine River
Ware
Angoon
Kinaskan Lake

Figure 7.4 Mean sea-level pressure for October



Influence of the length of mountain:
(a) Mountain Chain (b) Isolated Peak

Influence of shape of slope:
Abrupt Ridges

Figure 7.5 Influence of mountain chain, isolated peak and abrupt ridges on airflow (Queney *et al.*, 1960)

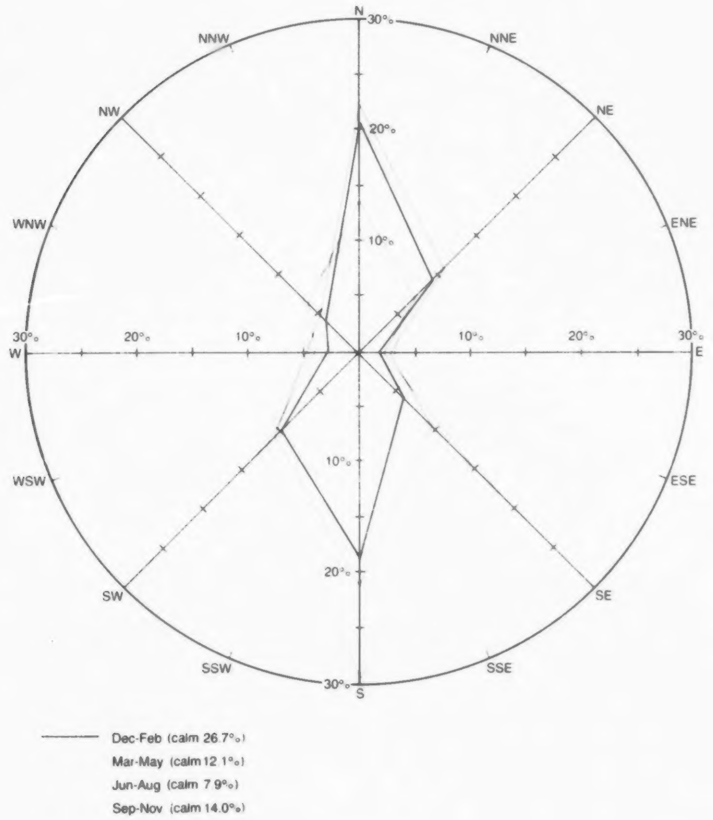


Figure 7.6 Aishihik quarterly percentage frequency of occurrence of a given wind direction for all speeds

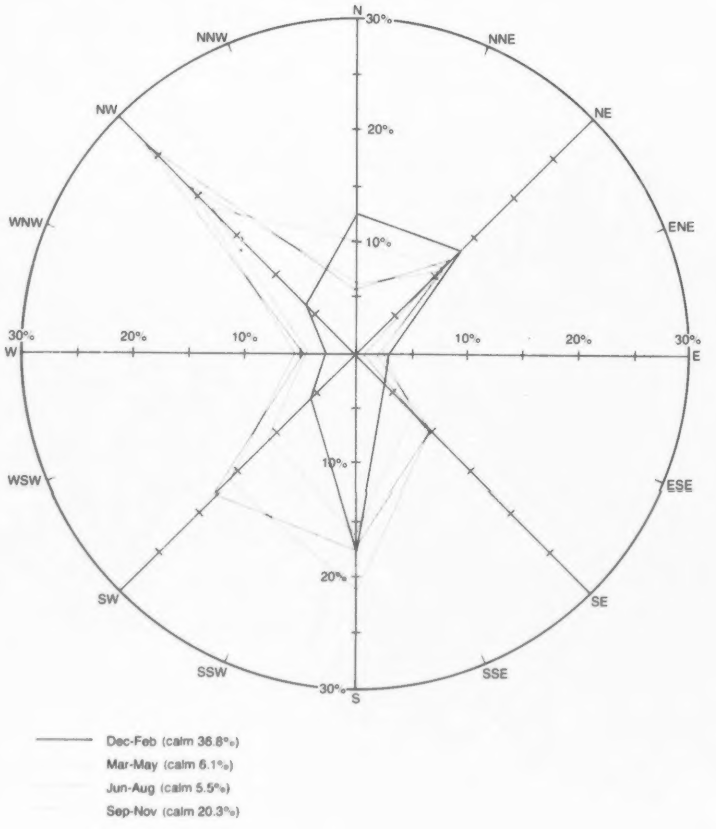


Figure 7.7 Beaver Creek quarterly percentage frequency of occurrence of a given wind direction for all speeds

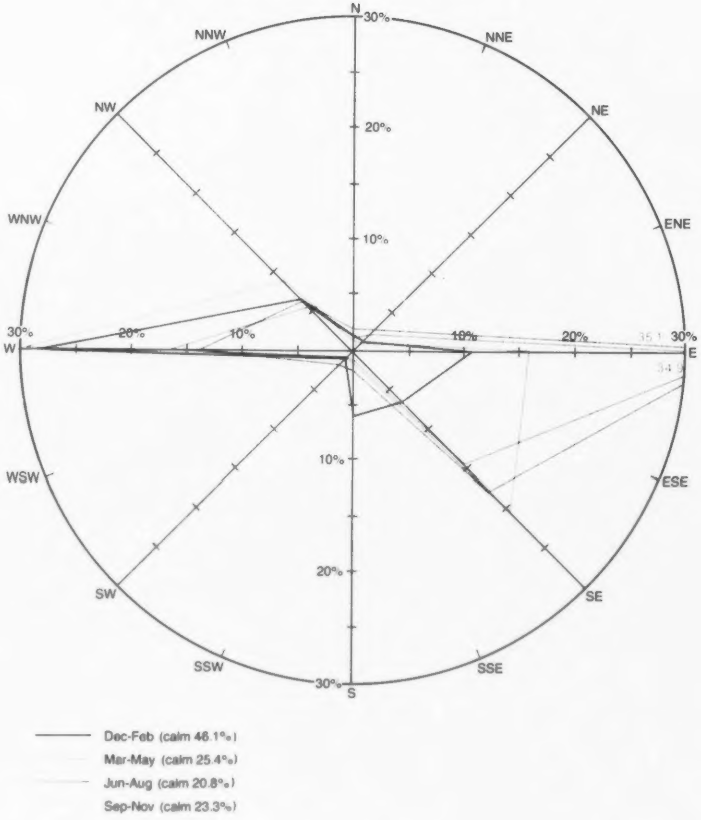


Figure 7.8 Burwash quarterly percentage frequency of occurrence of a given wind direction for all speeds

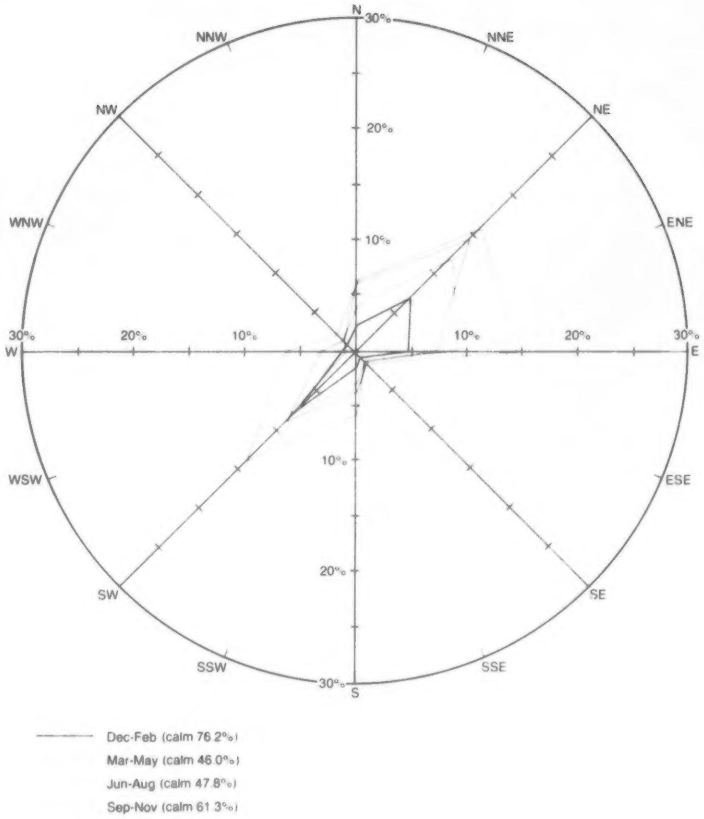


Figure 7.9 Dawson A quarterly percentage frequency of occurrence of a given wind direction for all speeds

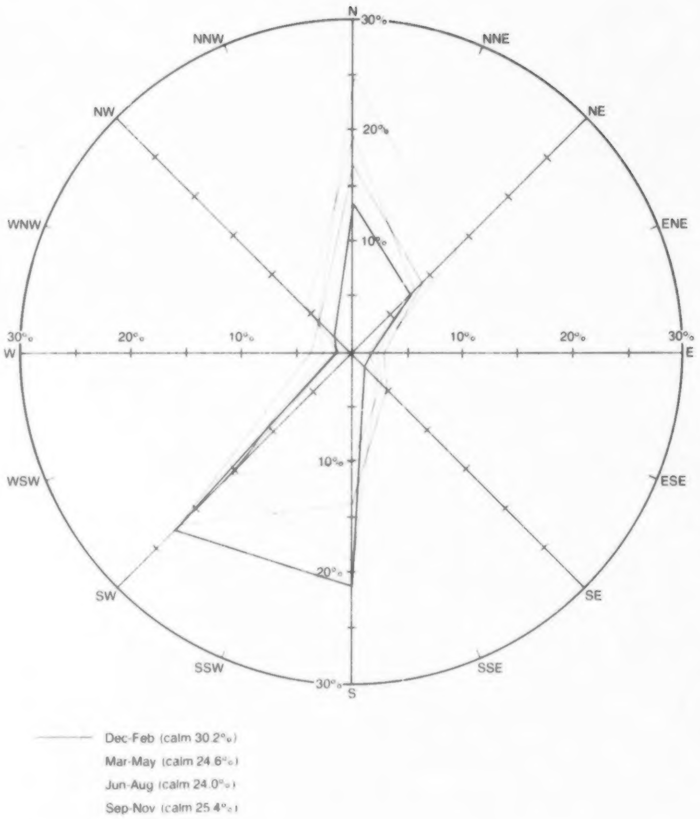


Figure 7.10 Dawson quarterly percentage frequency of occurrence of a given wind direction for all speeds

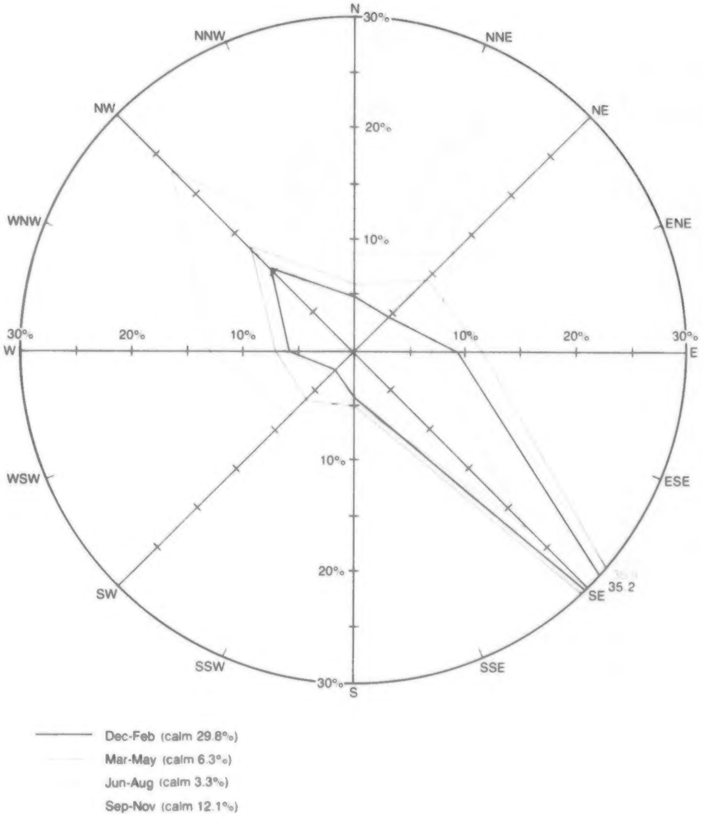


Figure 7.11 Faro quarterly percentage frequency of occurrence of a given wind direction for all speeds

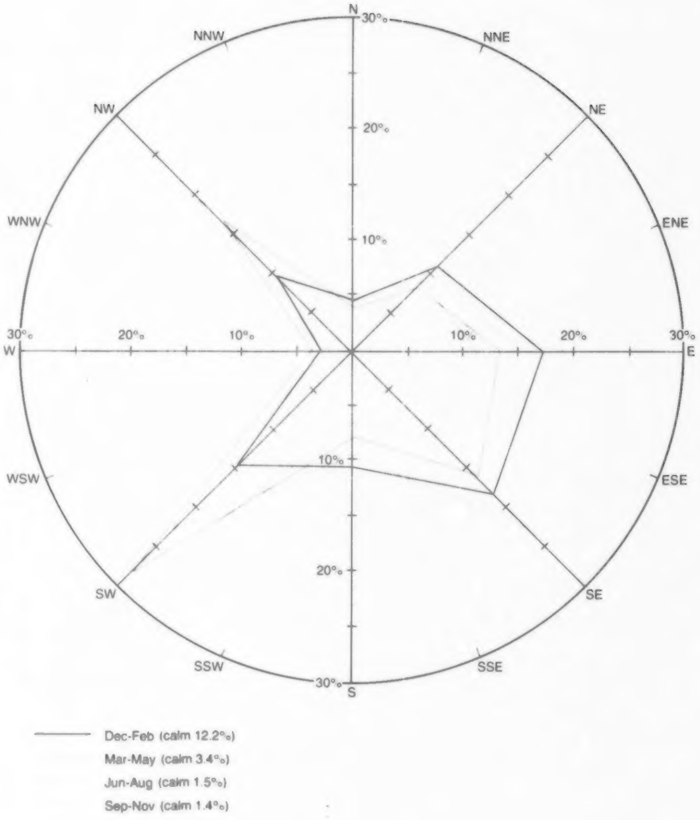


Figure 7.12 Kluane Lake quarterly percentage frequency of occurrence of a given wind direction for all speeds

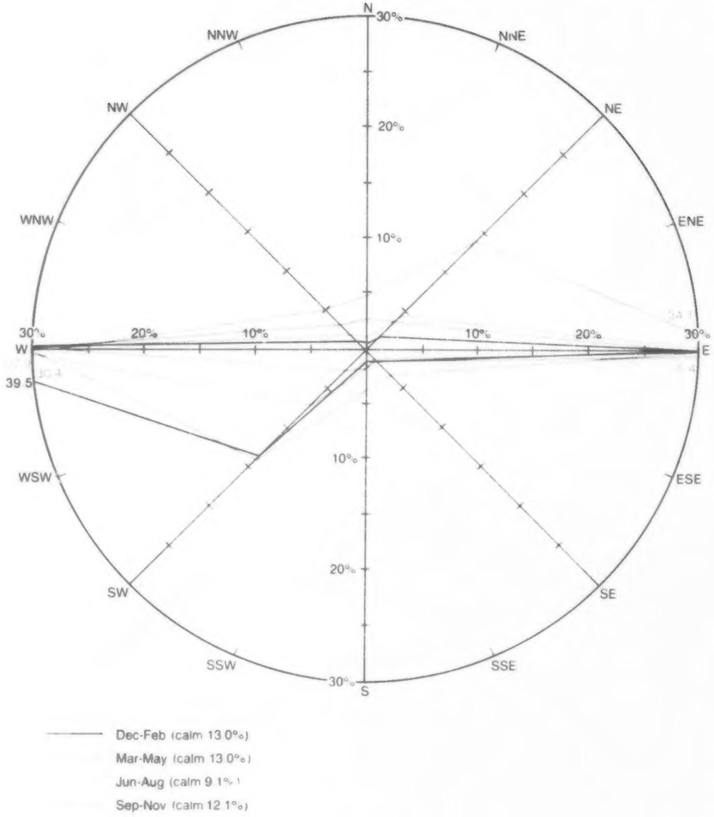


Figure 7.13 Komakuk Beach A quarterly percentage frequency of occurrence of a given wind direction for all speeds

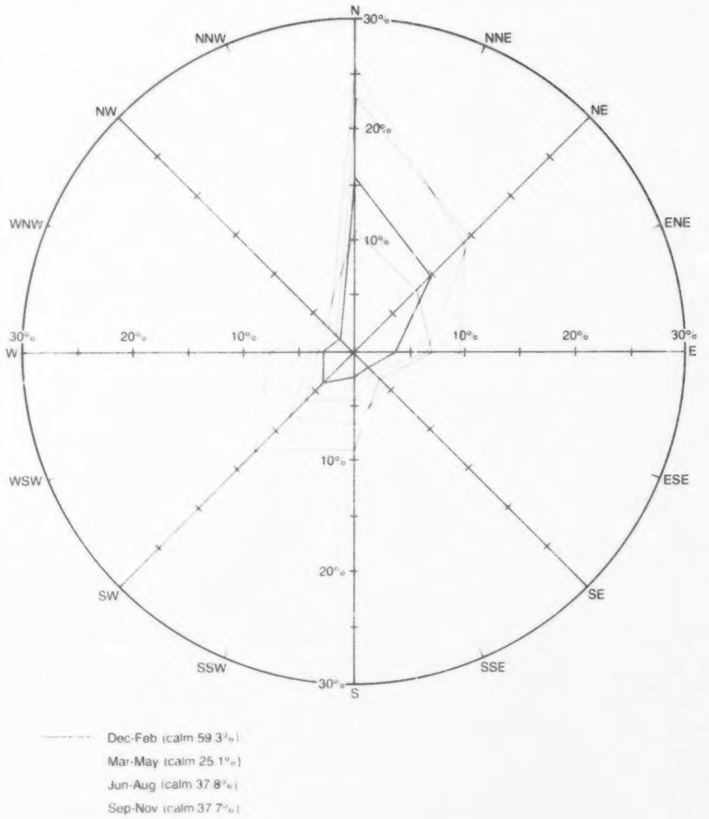


Figure7.14 Mayo A quarterly percentage frequency of occurrence of a given wind direction for all speeds

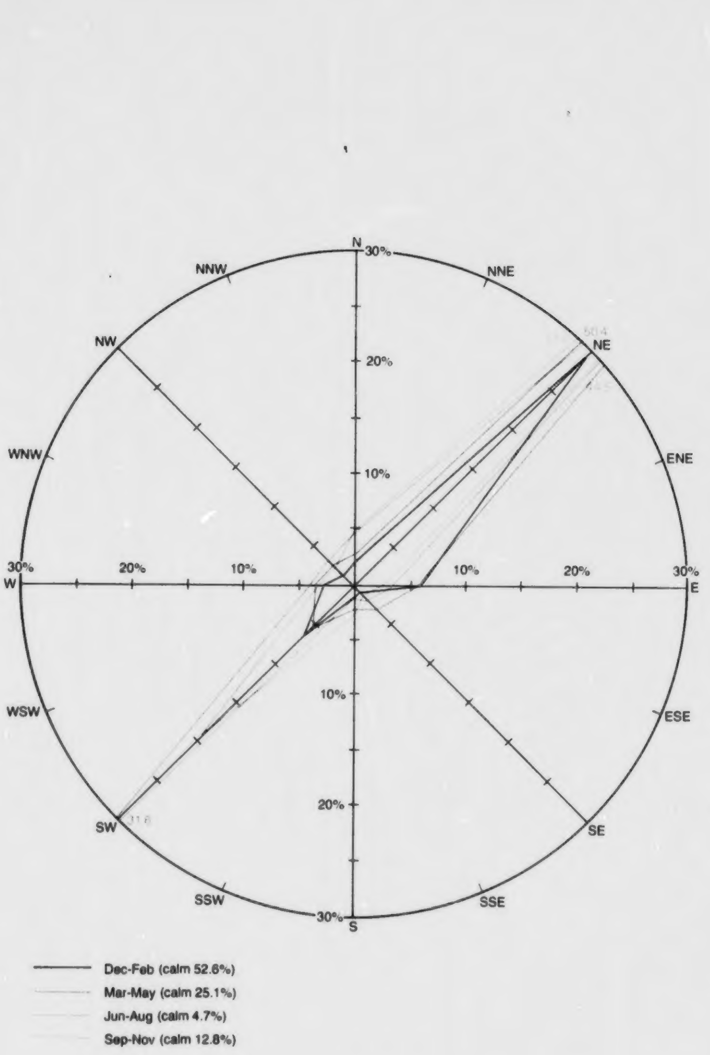


Figure 7.15 Old Crow quarterly percentage frequency of occurrence of a given wind direction for all speeds

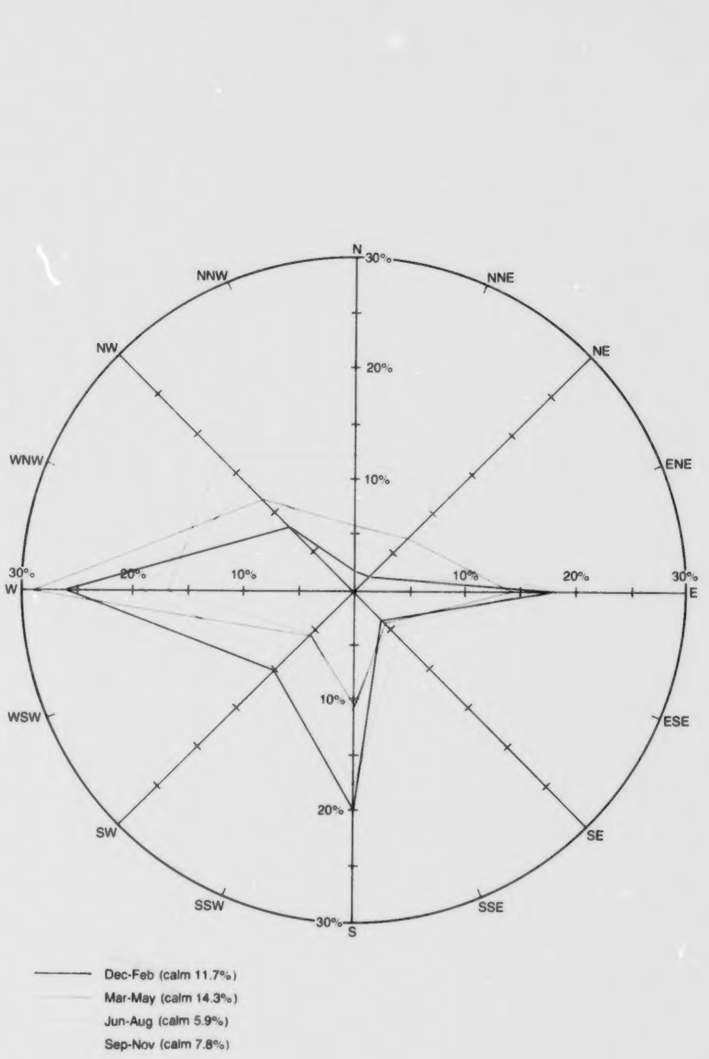


Figure 7.16 Shingle Point A quarterly percentage frequency of occurrence of a given wind direction for all speeds

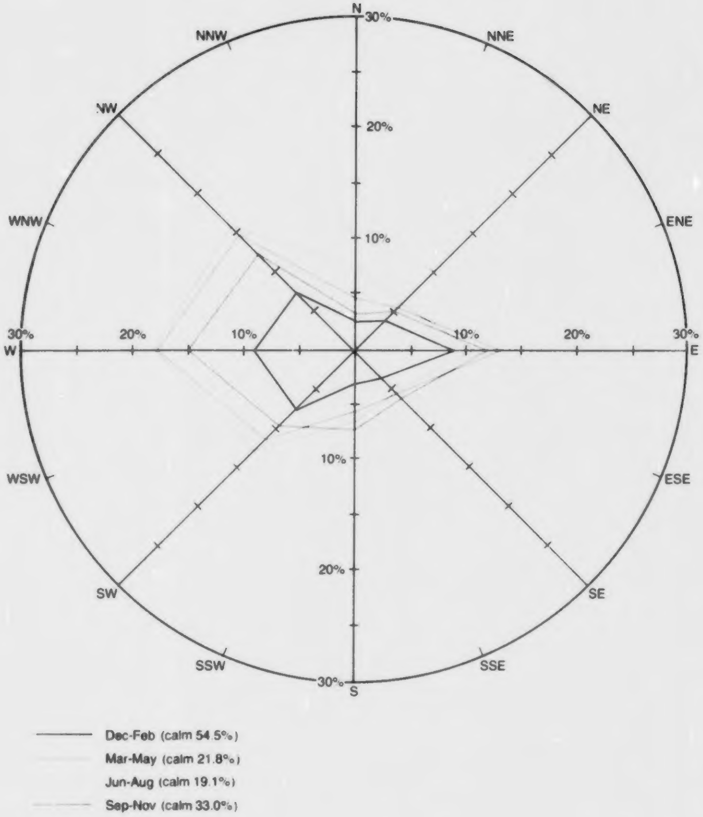


Figure 7.17 Snag A quarterly percentage frequency of occurrence of a given wind direction for all speeds

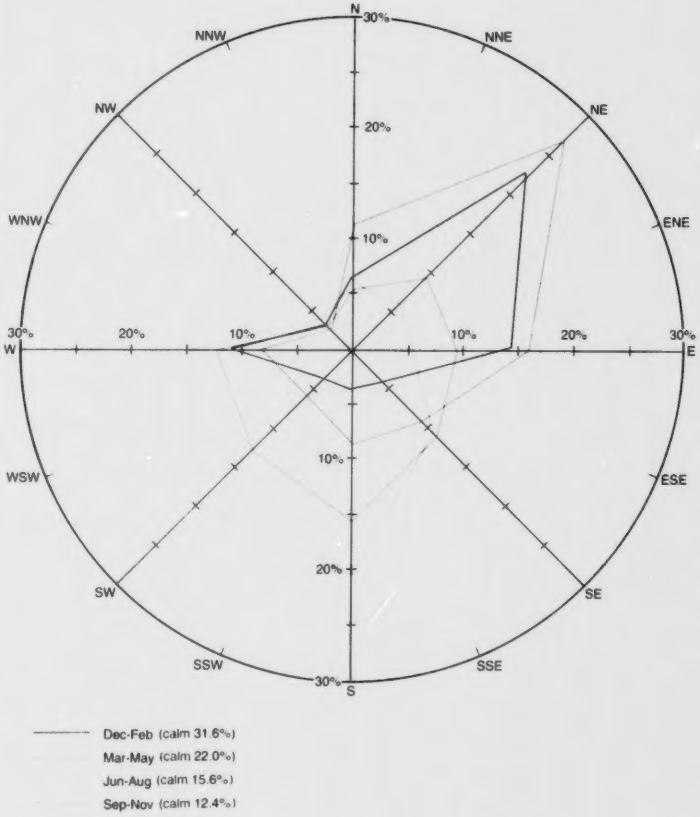


Figure 7.18 Teslin A quarterly percentage frequency of occurrence of a given wind direction for all speeds

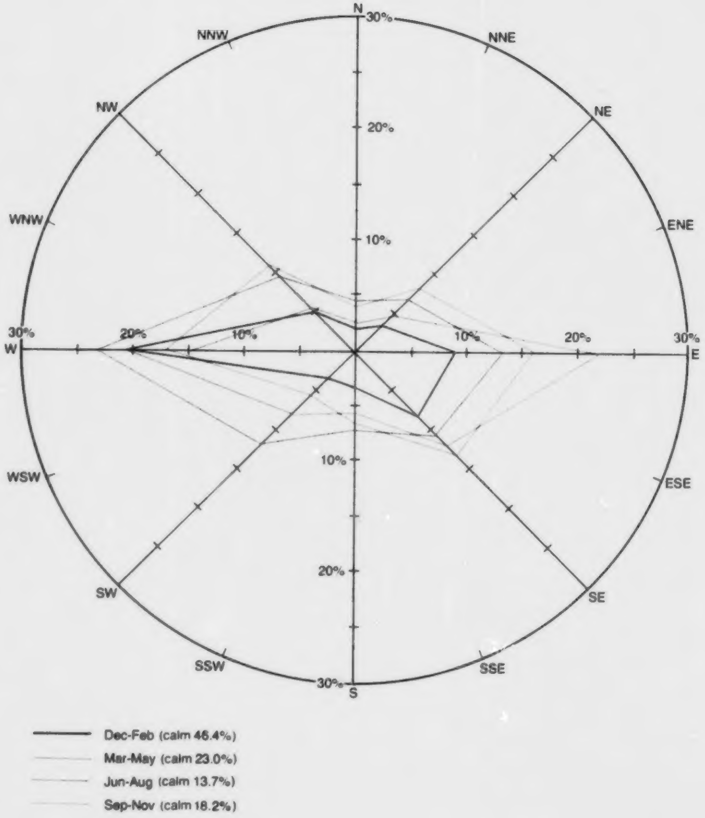


Figure 7.19 Watson Lake A quarterly percentage frequency of occurrence of a given wind direction for all speeds

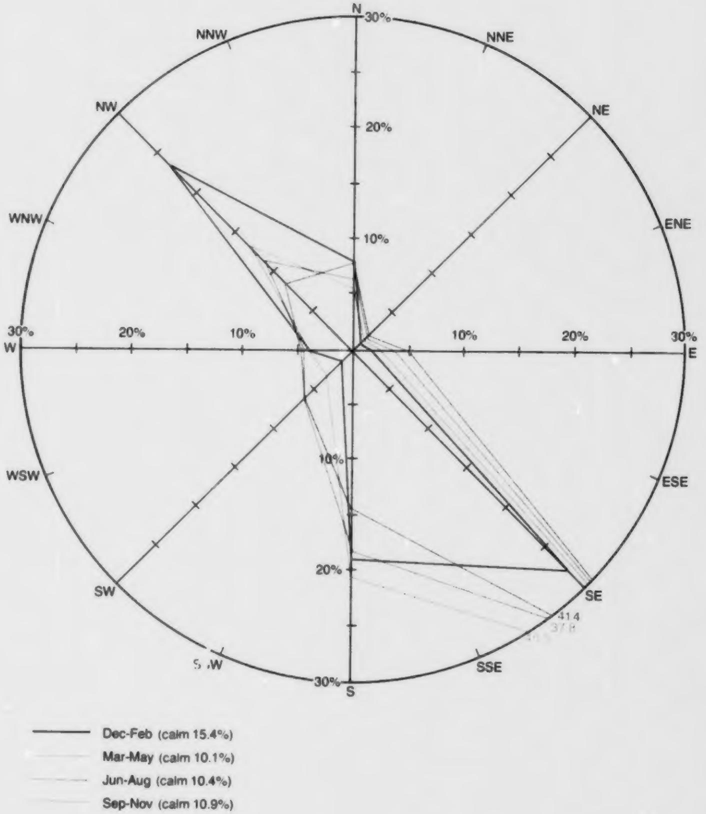


Figure 7.20 Whitehorse A quarterly percentage frequency of occurrence of a given wind direction for all speeds

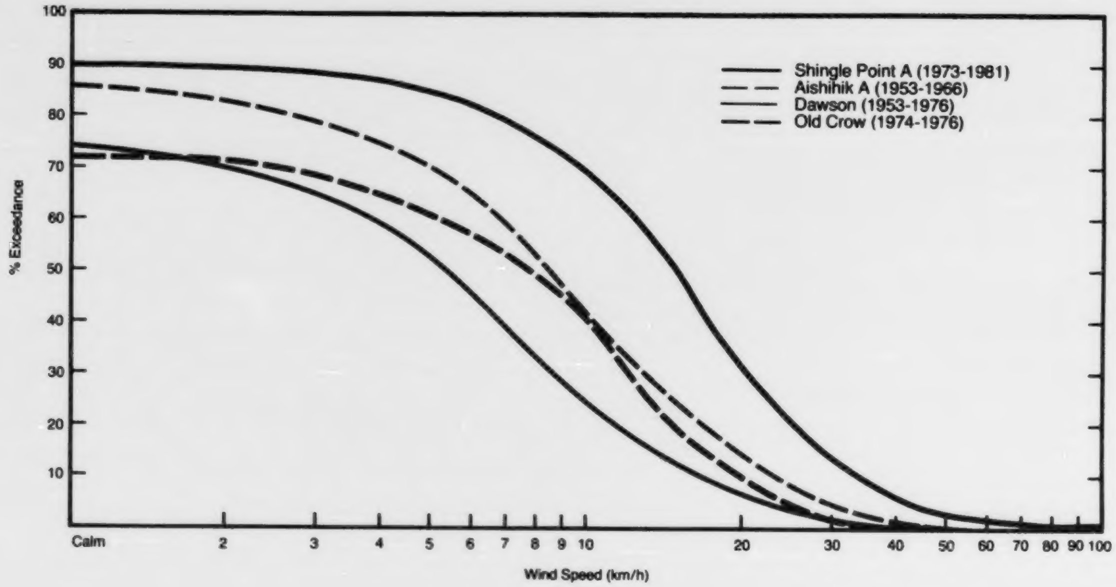


Figure 7.21 Percentage exceedance of wind speed for selected stations

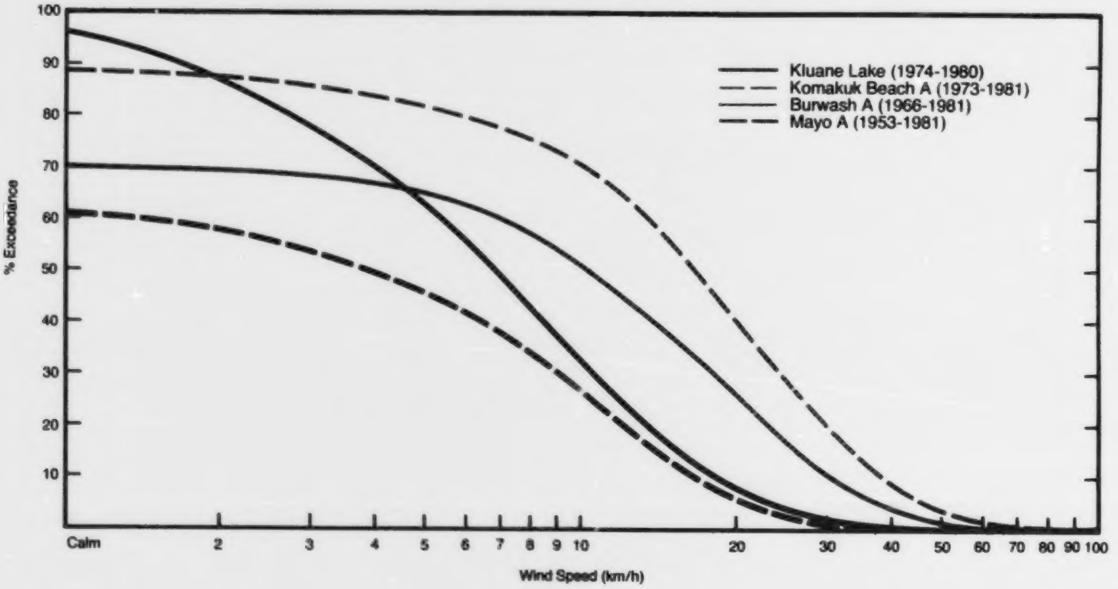


Figure 7.22 Percentage exceedance of wind speed for selected stations

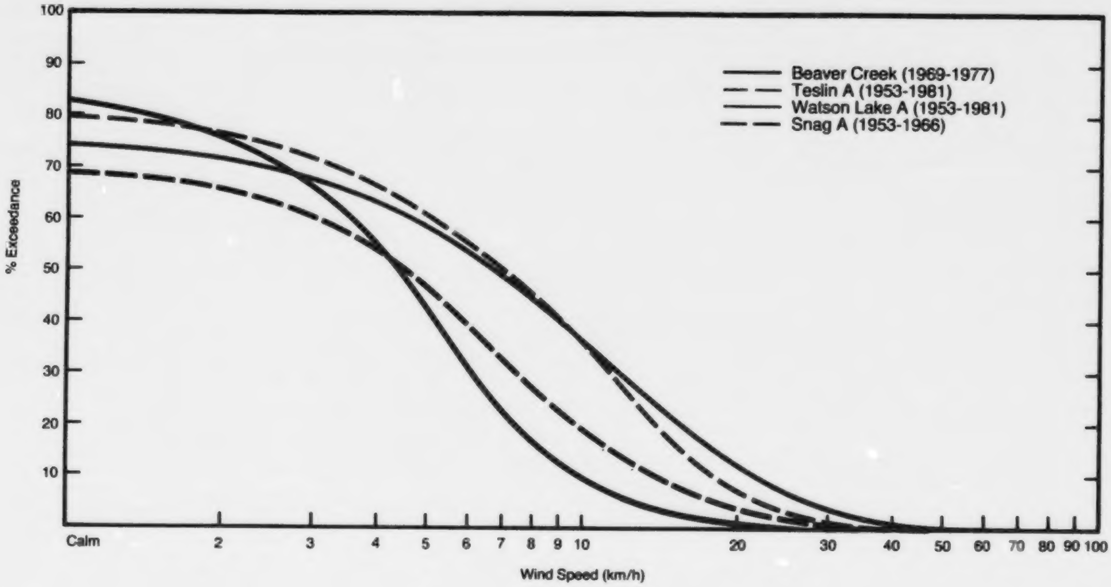


Figure 7.23 Percentage exceedance of wind speed for selected stations

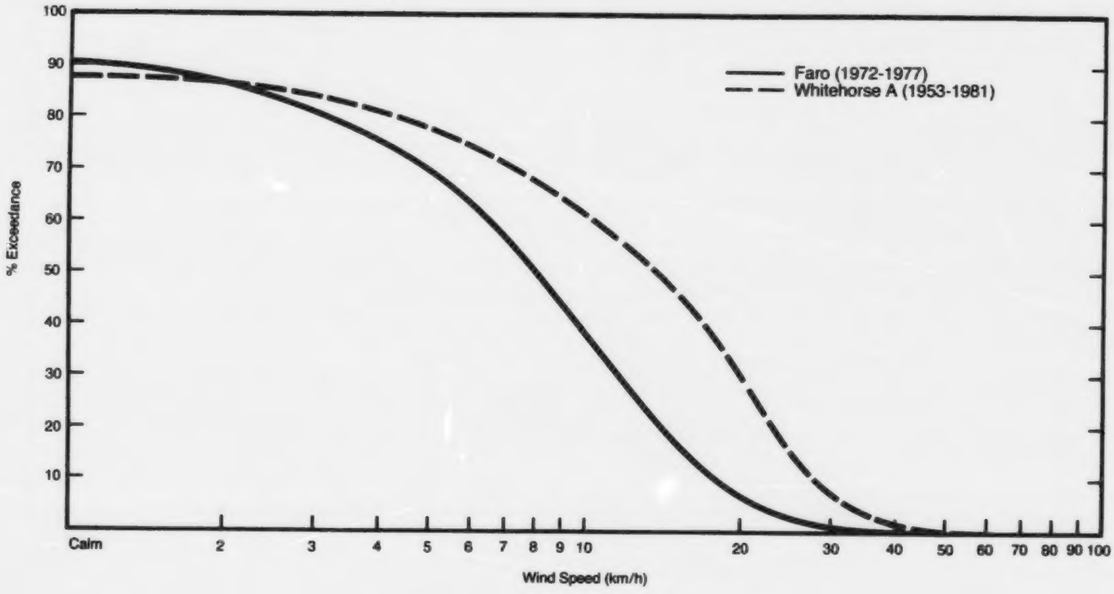


Figure 7.24 Percentage exceedance of wind speed for selected stations

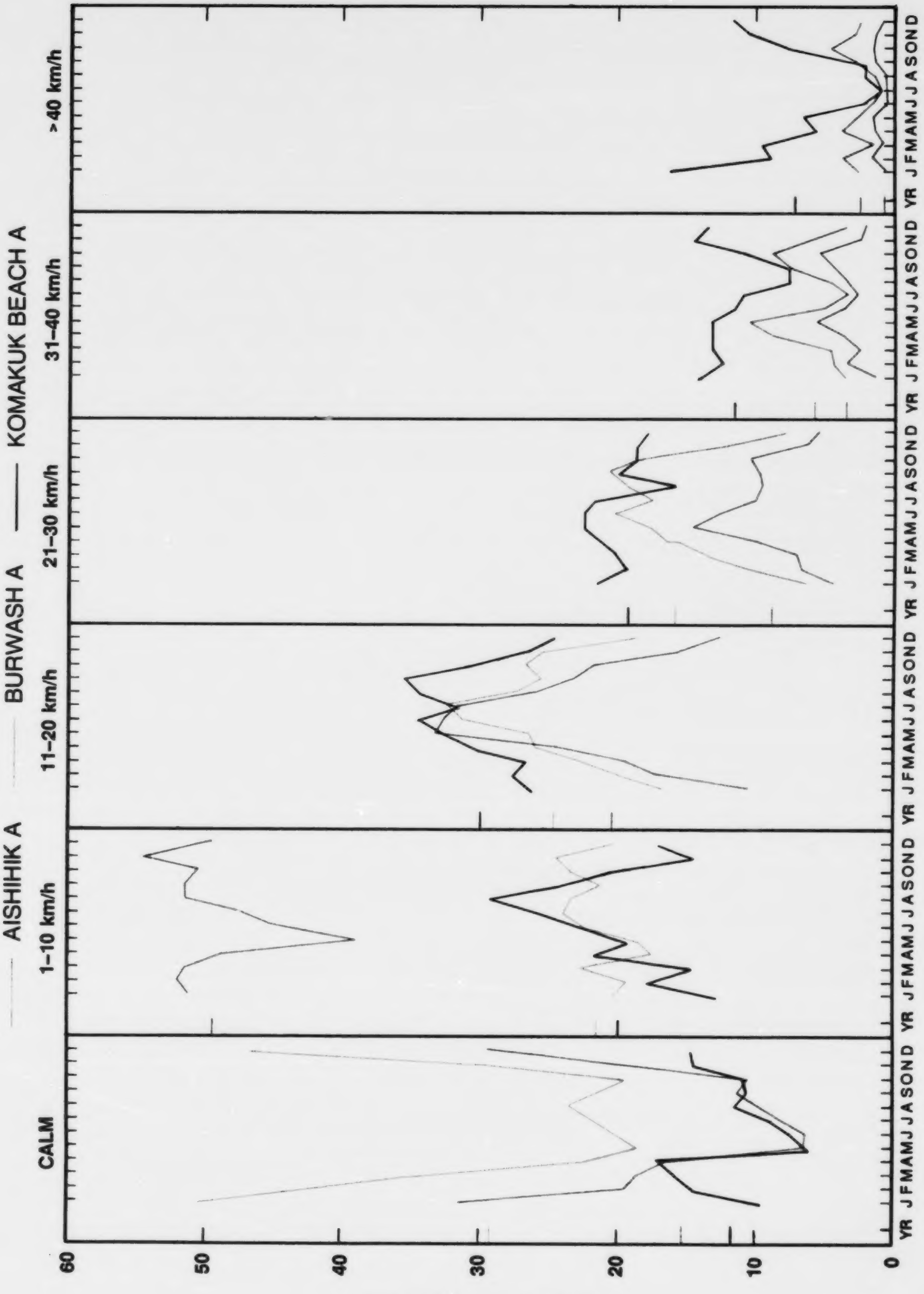


Figure 7.25 Annual and monthly percentage frequencies of wind speeds by specified wind speed classes for all directions

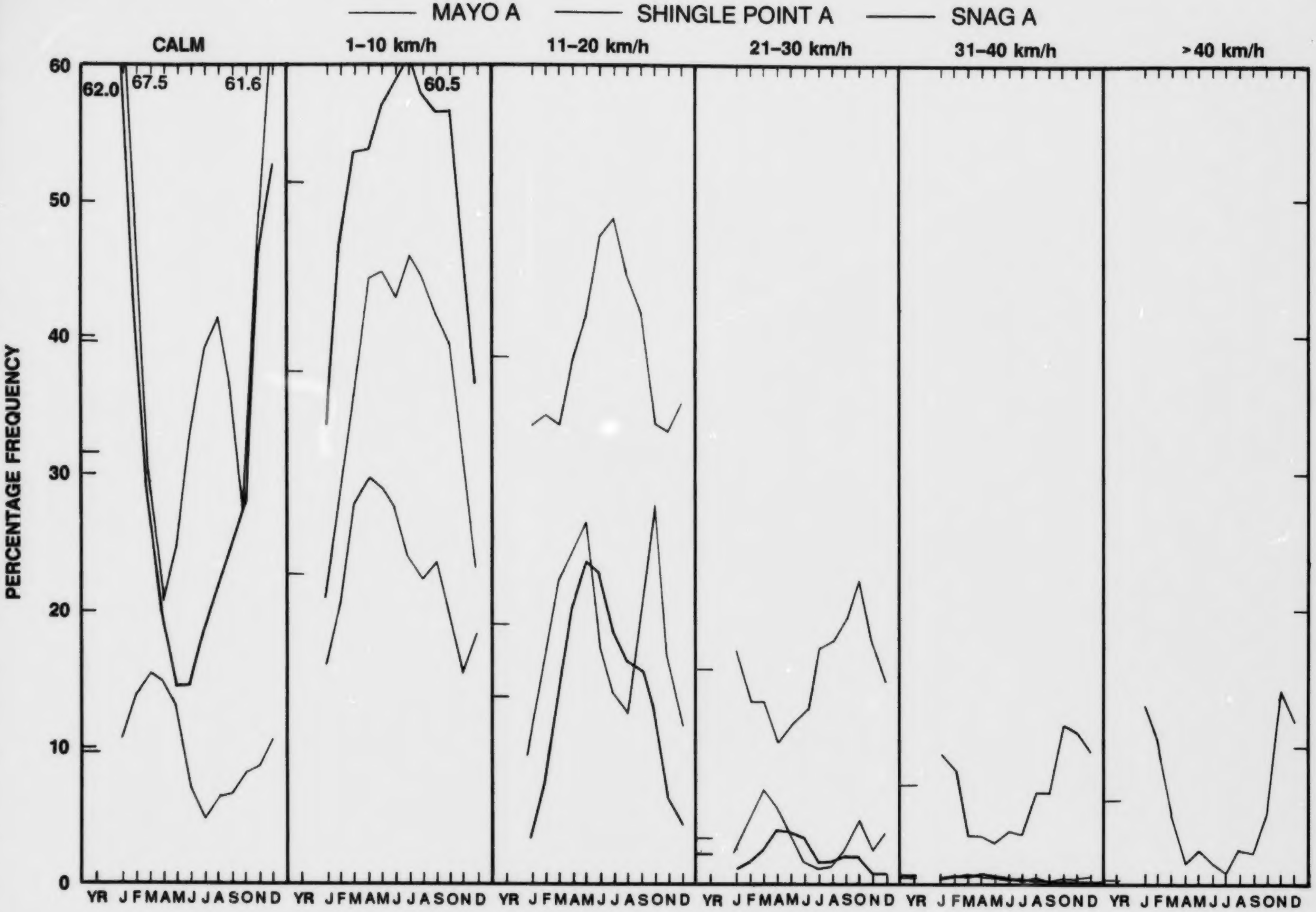


Figure 7.26 Annual and monthly percentage frequencies of wind speeds by specified wind speed classes for all directions

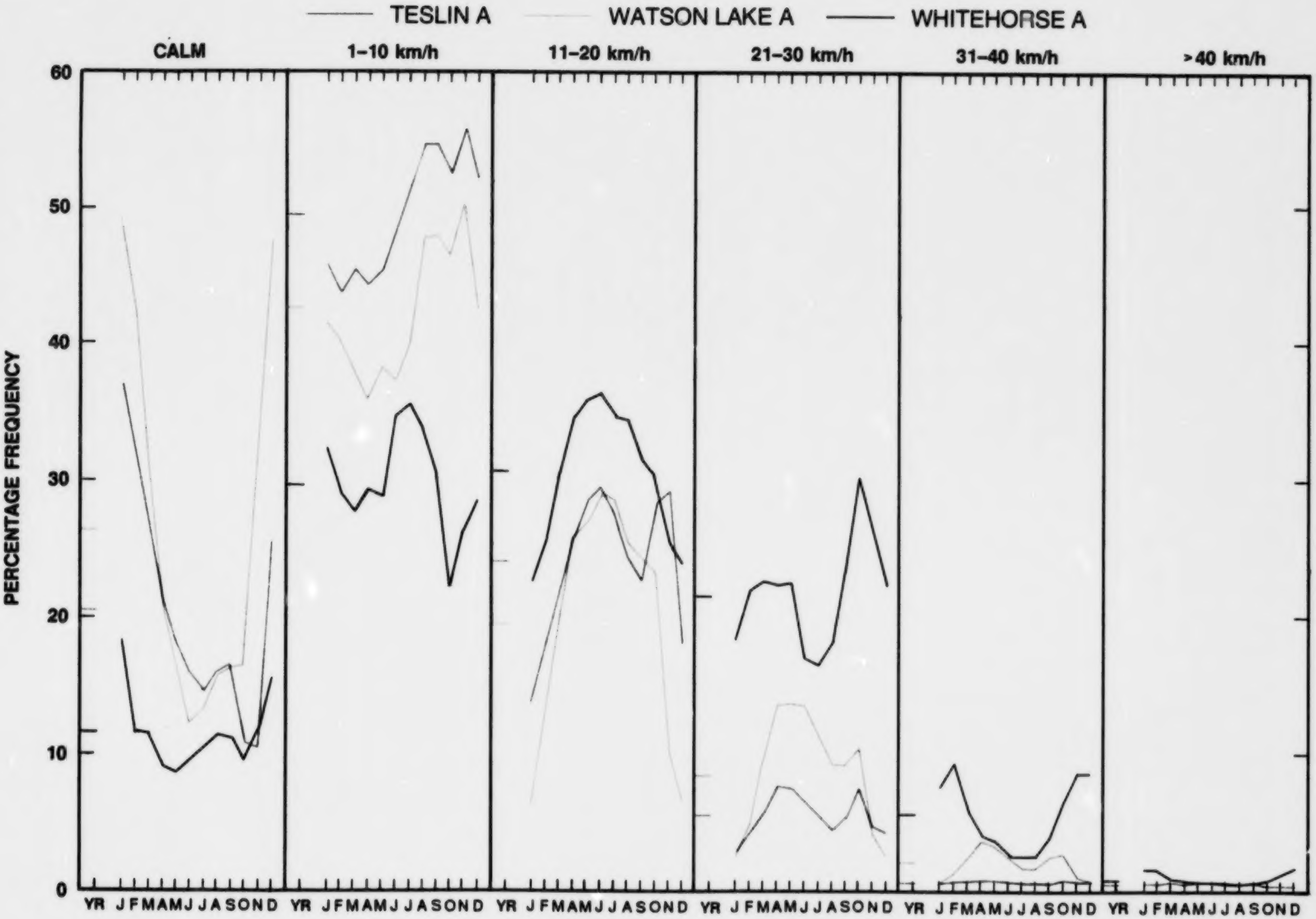


Figure 7.27 Annual and monthly percentage frequencies of wind speeds by specified wind speed classes for all directions

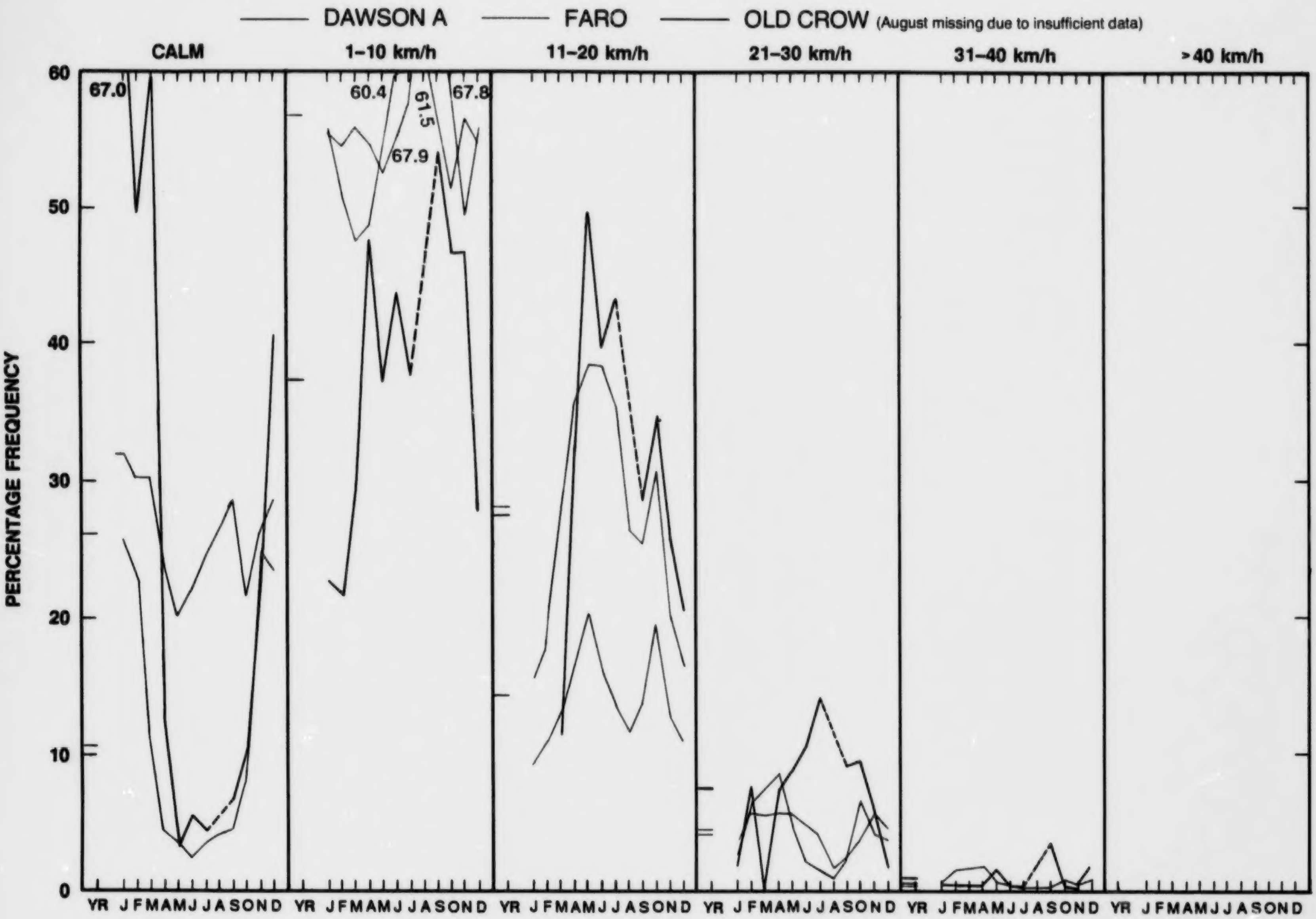


Figure 7.28 Annual and monthly percentage frequencies of wind speeds by specified wind speed classes for all directions

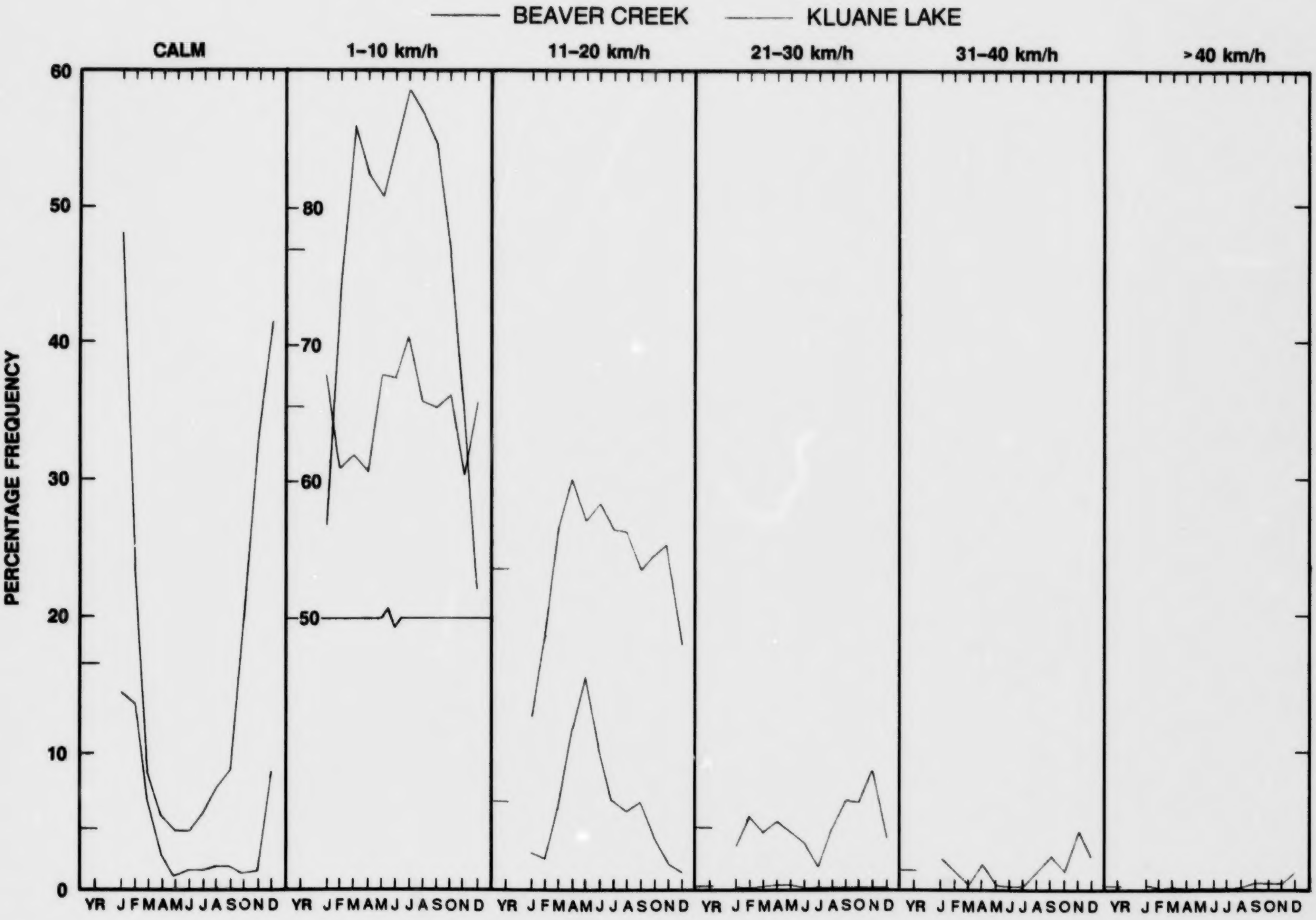


Figure 7.29 Annual and monthly percentage frequencies of wind speeds by specified wind speed classes for all directions

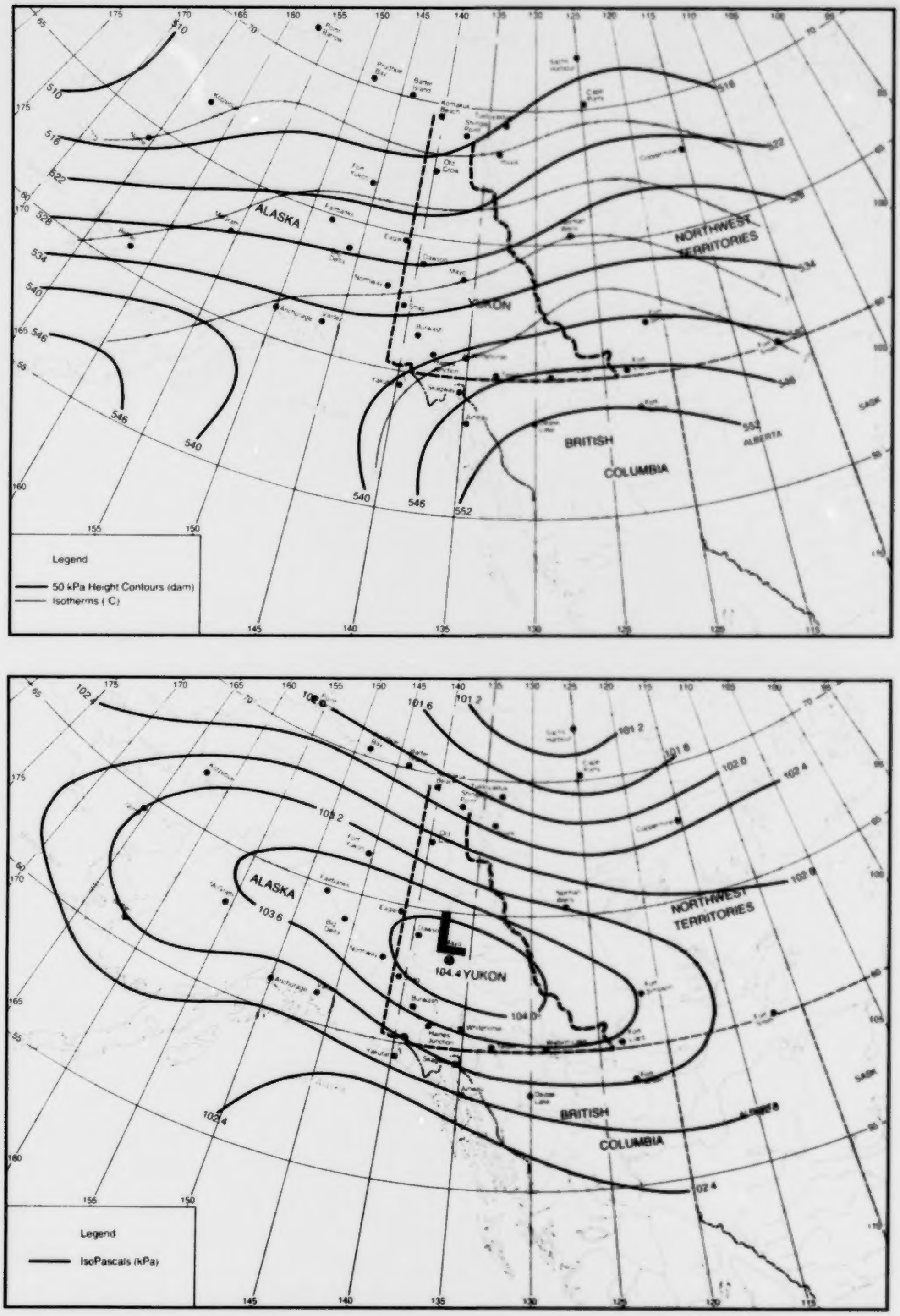

ALASKA
YUKON
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
SASK
510
516
522
528
534
540
546
552
Legend
50 kPa Height Contours (dam)
Isotherms (C)
101.2
101.6
102.0
102.4
102.8
103.2
103.6
104.0
L
104.4
Legend
IsoPascals (kPa)

Figure 7.30 50-kPa (a) and MSL pressure (b) patterns for 1200 GMT, December 14, 1979 depicting extreme westerly winds on the north coast of Yukon

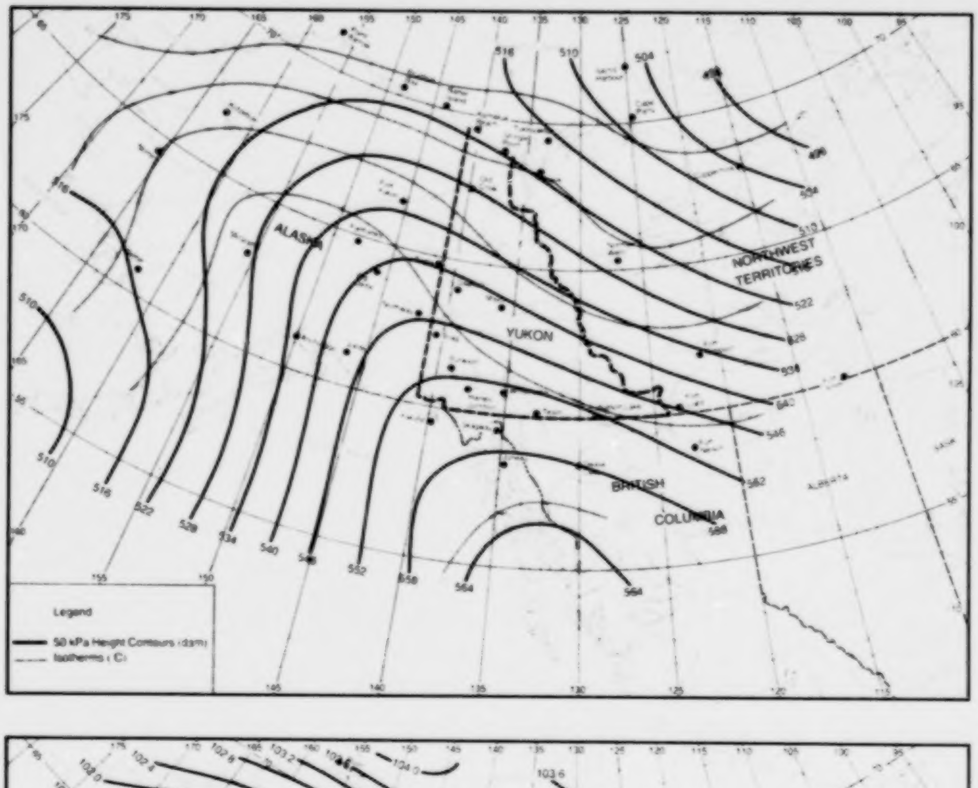

ALASKA
YUKON
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
Legend
50 kPa Height Contours (dam)
Isotherms (°C)
516
510
504
522
528
534
540
546
552
558
564
H
103.9
L
Legend
IsoPascals (kPa)
102.4
102.8
103.6
96.4

Figure 7.31 50-kPa (a) and MSL pressure (b) patterns for 1200 GMT, December 31, 1980 which caused destructive winds in southwestern Yukon

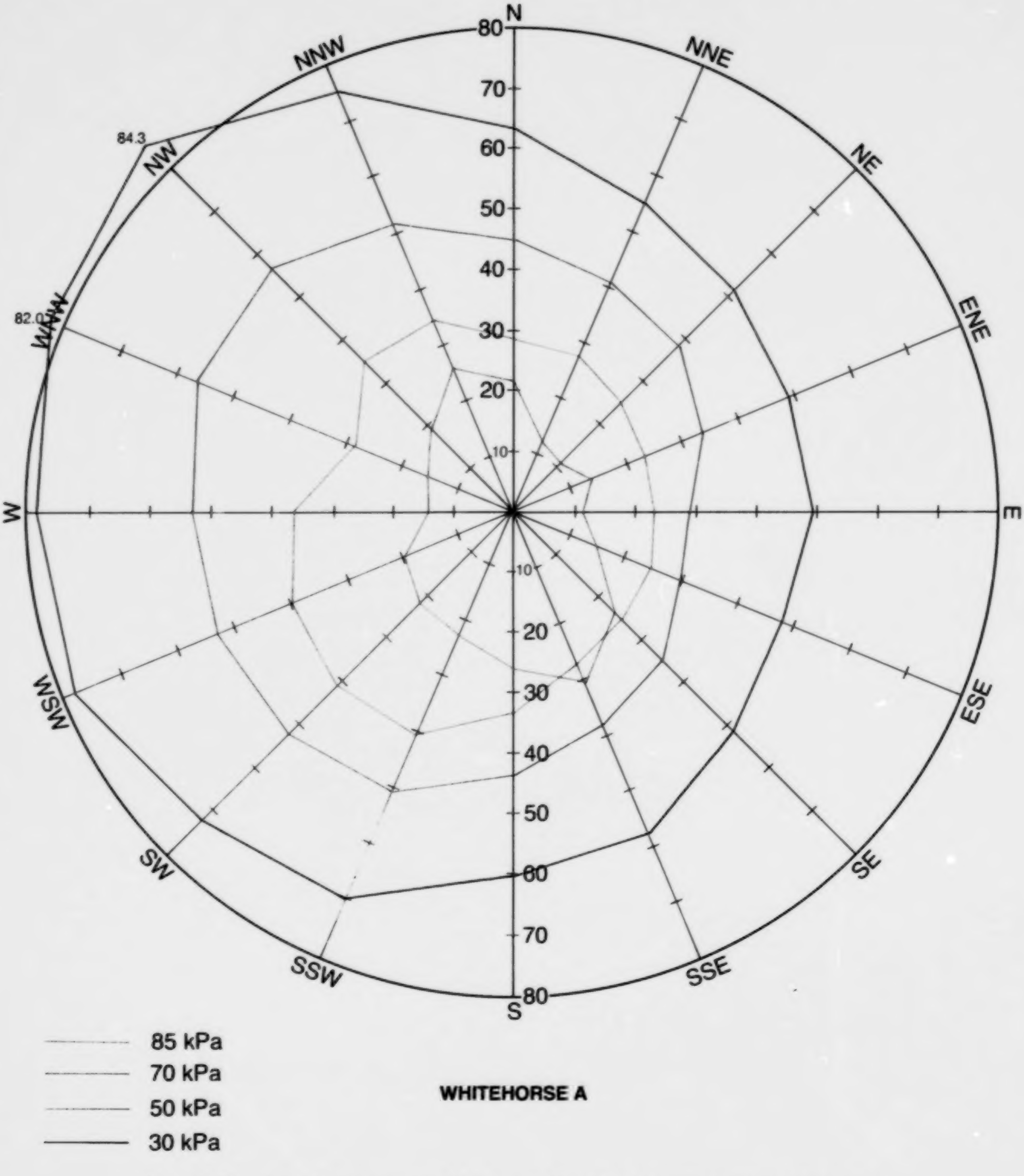
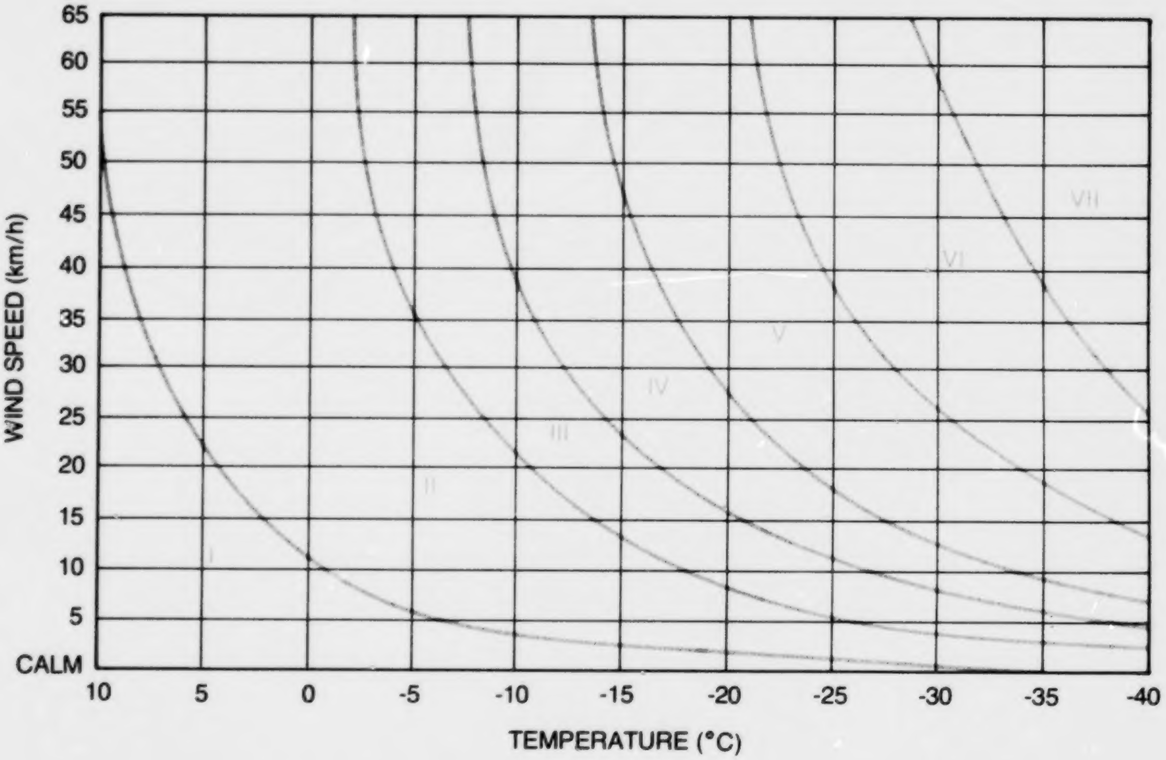


Figure 7.32 Annual mean vector winds at standard levels in the atmosphere for Whitehorse A



How to read your Wind-Chill Chart. Use this chart in the same manner as a grid map, ie. read horizontally the temperature and the wind velocity vertically. The point of intersection is the wind-chill factor. For example, if the wind were 30 km/h and the temperature -25°C, the wind-chill index would be V.

I Comfortable with normal precaution.

II Work and travel become uncomfortable unless properly clothed.

III Work and travel become more hazardous unless properly clothed. Heavy outer clothing necessary.

IV Unprotected skin will freeze with direct exposure over prolonged period. Heavy outer clothing becomes mandatory.

V Unprotected skin can freeze in one minute with direct exposure. Multiple layers of clothing mandatory. Adequate face protection becomes important. Work and travel alone not advisable.

VI Adequate face protection becomes mandatory. Work and travel alone prohibited. Supervisors must control exposure time by careful work scheduling.

VII Personnel become easily fatigued. Buddy system & observation mandatory.

NOTE

Proper clothing simply means protecting all skin areas from direct wind with sufficient thickness to prevent undue coldness.

Figure 7.33 Temperature/wind-chill index (Maxwell, 1980)

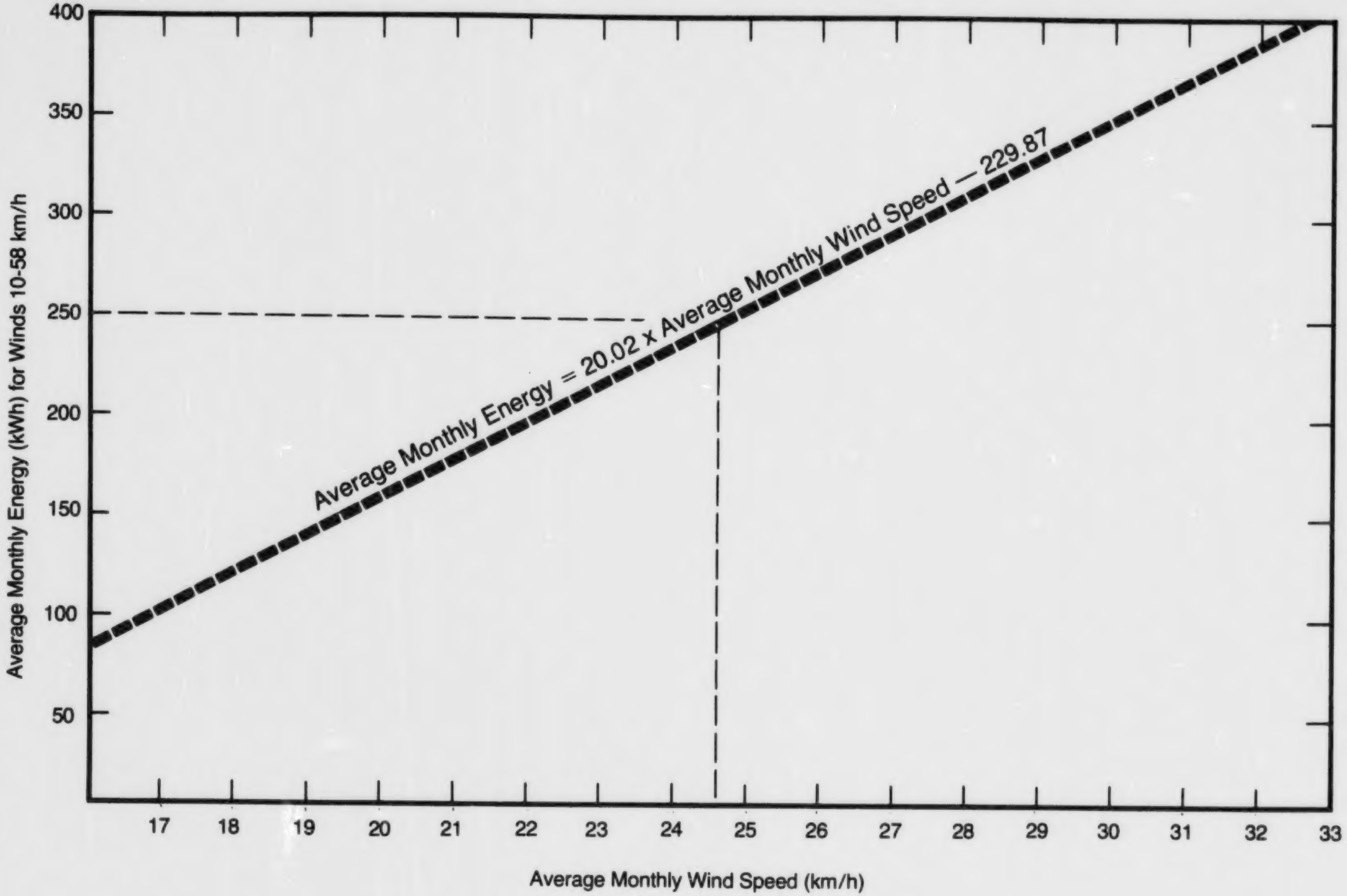


Figure 7.34 Average monthly energy as a function of average monthly wind speed (Lamont, 1976)

8.0 TEMPERATURE

Temperature data for some 32 stations in Yukon for which the 30-year normals (1951-1980) are published were used in the analysis of temperature information. In addition, the charts of temperature fields used the 30-year normal data from 25 stations in the Mackenzie Valley and northern British Columbia. Further, limited data for six other stations in Yukon (which are now closed or have limited information) as well as 12 stations in eastern Alaska and the panhandle were utilized to complete the analyses near Yukon borders. Some adjustments for the effects of elevation were made and the analysed mean temperature charts have been drawn to generally depict these effects.

8.1 Elevation-Latitude-Slope and Aspect Effects on Temperature

One need not be an expert on climate to realize that temperature generally decreases with elevation. In Yukon snow usually remains the year-round above the 2000-2500m level. By late August it can fall everywhere, but only fails to melt above the 1500m level. The massive snow and ice fields in the St. Elias Mountains region are permanent above the 2400m level. Although July is the warmest month with mean temperatures near 16°C at interior valley stations, at the 3000m level in the Ice Field Ranges the mean temperature is still below freezing.

The rate of change of temperature is much greater in the vertical than in the horizontal. On the average the temperature decreases 0.55°C to 0.8°C per 100m increase in elevation over southern Yukon from April to October and over northern Yukon from May to September inclusive. For comparison, the temperature can change a mere 5 to 10°C in hundreds of kilometres horizontally. The vertical temperature change, the lapse rate, changes as new air masses are advected into Yukon. There is a diurnal variation in direct response to solar heating and radiational cooling, as well as a seasonal cycle. Sample lapse rates at selected upper air stations are given in Table 8.1.

The lapse rates above the 85-kPa level usually represent conditions in the free atmosphere (conditions a distance away from the ground that are free from surface friction effects). The level at which "free atmosphere" conditions prevail depends on a number of factors but it is usually a few hundred metres to a kilometre removed from the surface. It is about a kilometre to 1500m ASL over Whitehorse but about 7km ASL over Mt. Logan. The lapse rate between 70-kPa and 50-kPa over Whitehorse varies from 0.60°C/100m in January to 0.66°C/100m in October (Table 8.1). These are similar to lapse rates over other mountainous regions. At such levels even though the actual temperatures vary considerably from season to season the variation in lapse rate is small. Eley and Findlay (1977) sampled maximum and minimum summer temperature on several local transects in Yukon and found a consistent decrease of mean daily maximum temperature with elevation of 0.80°C/100m. The mean minimum temperature generally decreases with elevation but not as consistently as the maximum temperature. Extrapolation of the maximum temperature in summer using the 0.80°C/100m lapse rate should give quite accurate results.

Air which is lifted expands and cools; descending air is compressed which heats the air parcel. Such heating helps to create a warm-slope zone on the side of a hill or mountain where the minimum temperature can be higher than in the valley bottom or some distance further up the slope. Partly for this reason a convex (shallow dome shape) area or a bench part way up the slope with good air drainage on the downslope side has the highest minimum temperature locally and a longer frost free period by a number of days. Changes in temperature from place to place are less marked over relatively flat land or in a broad valley than in a narrow deep valley.

Air in a valley a few hundred metres from the surface on a mountain slope but at the same elevation is usually considered to be in the free atmosphere. The mean temperature of the air next to the slope in summer is generally higher than in the free atmosphere at the same elevation. In winter, mountain slope air is usually colder than that in the adjacent free atmosphere. This was found to be the case in the Austrian Alps by Steinhauser (1967). On the other hand a comparison in summer of the free air temperature over Whitehorse with the slope temperatures on the continental side of the St. Elias Mountains at the same elevation found that the slope temperatures were the lowest. It is believed that this is due to the presence of the permanent snow and ice fields (Webber, 1974). However, on the marine side the free air-slope temperature regime was similar to that in the Alps. Another important factor in Yukon is that the July temperatures on the marine side were generally lower than those at the same elevation on the continental side. Webber (1974) prepared profiles of continental versus marine slope temperature estimates for each month for Kluane National Park.

Steinhauser (1967) found that the mean January temperature was 1°C lower than in the free atmosphere at the 2500 to 3000m level and 5°C lower at elevations of 500 to 1500m. In July, the surface slope temperature was only slightly warmer than in the free air in the 2500 to 3000m range and 3°C higher at elevations of 500 to 1500m. Conditions on the continental side of the ice fields in Yukon are somewhat unique.

An example of the variation of mean and extreme temperaures with elevation between Anvil (1158m) and Faro (694m) as well as Elsa (814m) and Mayo (504m) are depicted in Figure 8.5. Note that in January the temperature increases with elevation. This is also the case in Figures 8.2-8.4 for levels below 70-kPa for all stations in January and for almost all months at high levels, particularly above 25-kPa. Since this trend opposes normal conditions, these cases of positive lapse rate are called temperature inversions which will be discussed in more detail in the following section. In July it is consistently warmer at Faro compared to Anvil; this pattern holds from mid-March to mid-October. The pattern is reversed due to the winter inversion which is common in December, January and February. This inversion is quite strong in both areas depicted in Figure 8.5, in fact it is common everywhere in a Yukon winter. The variability of the lapse rate of minimum temperature shows in the July curves for Elsa-Mayo in Figure 8.5 where the mean and extreme minima are higher at Elsa – the higher station. This difference, however, may be due to the difference in the length of the respective temperature records rather than due to the temperature-elevation relationship.

Air temperature is affected greatly by radiative transfers at the surface; heating or cooling decreases with distance from the surface so diurnal variations are much greater at ground level than in the free atmosphere depending on the amount of mixing that occurs. Similarly the temperature range between maximum and minimum become progressively smaller with elevation. Note in particular the narrowing difference between the extreme maximum and extreme minimum between Faro and Anvil in January (Figure 8.5). The inversion not only creates the positive lapse rate, it also inhibits mixing in the vertical so temperature at a given level tends to persist. In summer when the air is unstable and convection is common, the spread between maximum and minimum with height is not very significant as seen in the July curves in Figure 8.5.

Aspect (the direction the slope faces) controls the time and slope controls the intensity of incident radiation; hence, both affect maximum temperature. As mentioned in section 5.1, slopes facing east will start to heat soon after sunrise, reach a maximum soon after noon and then start cooling. On the other hand, west-facing slopes will be shaded much of the morning and not experience a maximum until near sunset. This cycle will differ in time when the sun is up continuously but the principle is the same. Aulitzky (1968) studied differences between northwest-facing slopes and southeast-facing slopes in the Austrian Alps. He found that the greater exposure of the southeastern slopes to solar energy produced higher minima and monthly means than on the northwest slopes. Although the mean air temperature differed little at the tree line this zone was 200m lower on the northwest slope.

After sunset the surface loses long-wave radiation and cools the air next to it. The rate of loss is a maximum when the air is dry and skies are clear. The minimum usually occurs shortly after sunrise or time of maximum net radiative loss when the sun is continuously above the horizon. Cold air is heavier than warm air at the same pressure so as surface air on a slope becomes colder than air in the free atmosphere at the same level, it sinks. The downslope flow can be hindered or stopped by even small barriers as the surface layer cooled due to effects of radiation can be only a metre thick. This air tends to get trapped in concave (dish shaped) areas commonly called "frost hollows".

The amount of solar energy received in a given region decreases with increasing latitude (section 5.2.1). This generally results in lower mean temperatures as latitude increases.

Monthly mean temperature is shown for stations at progressively higher latitude in Yukon in Figure 8.6. A number of effects are evident: the annual mean temperature decreases with latitude (also with elevation); winter increases in length with latitude (period when mean temperature is < 0°C); length of summer decreases with latitude (period when mean temperature > 10°C) except note summers are longer and warmer at Dawson than at Whitehorse primarily because the lower elevation over-rides the latitude effect at Dawson. Monthly mean temperature does not consistently decrease with latitude. Note that the winter mean temperatures for December and January at Shingle Point are higher than at both Dawson and Old Crow. The coast experiences higher winds than the interior which bring warmer air in the inversion down to the surface. Also some heat is conducted upward through the ice on the Beaufort Sea to limit radiative heat loss at the surface on the coast. Note the affect of latitude on temperature is much less in summer when the sun is up for long hours or continuously.

Elevation, latitude, slope and aspect affect temperature in varying degrees but Marcus (1965) noted that although local variations can be large, stations across the St. Elias range from Yakutat to Whitehorse all respond to cold or warm trends due to the synoptic scale generally at the same time.

8.2 The Inversion

As mentioned in the previous section an inversion is a positive temperature lapse rate, a reversal of the normal vertical temperature profile. The phenomenon is primarily produced by a net radiation loss at the earth's surface but can occur at any level in the atmosphere. It can be produced just as well by warming at the top of a given layer. The advection of warm air over a cold surface results in the formation of an inversion as shown by the blue curve in Figure 8.1. This type is common on the marine coast of the St. Elias-Coast Mountains in summer as well as along the north coast.

Nocturnal inversions occur almost every night when there is little or no cloud cover, but are usually quite shallow, particularly in summer. The upper temperature profiles for 1200 GMT, near the time of maximum net radiative loss, in Figure 8.2-8.4 show the nocturnal inversion is common below 90-kPa. This type of inversion is usually destroyed by solar heating by mid-day, but the time varies with the season and latitude.

At high latitudes during the polar night intense inversions develop to create a typical temperature profile in the continental Arctic (cA) air mass (section 12). Figure 8.1 depicts various forms of the Arctic inversion described in detail by Maxwell (1982). Most of these inversions are topped by an isothermal (constant temperature) layer; then the temperature decreases normally with elevation. The Arctic inversion which is usually in place over Yukon from late October to early March is mainly imported as a characteristic of the cA air mass. However, it can develop or intensify in deep Yukon valleys under prolonged periods of calm wind and clear skies in winter. The increase in temperature with height in these inversions is generally most extreme in January. The mean daily temperature in January at Faro is -25.5°C as compared to -20.0°C at Anvil, 467m higher in elevation (Figure 8.5). This results in a positive lapse rate of 1.2°C/100m. Usually the inversion is most intense below the 1500m level then topped by an isothermal layer about 1000m thick above which the lapse rate returns to a normal negative value. The most dramatic conditions occur when warming westerly winds aloft develop soon after a cold spell has been established at the surface. For example, valley temperatures of -40 to -50°C can rise through the inversion to -15°C at the 1000m level and to near 0°C at 1500 to 2000m. It is noted that warming in winter over mountainous terrain generally occurs first at the higher elevations. The highlands and plateaux can experience mild spells more frequently and for longer periods than deep valley locations.

A number of animals in Yukon have applied this climate feature to their habitat. Mountain sheep and goat reside at elevations of 1000 to 1500m where winter temperatures are the least harsh. Moose are known to migrate to higher elevations during severe cold spells; also caribou in Yukon winter in the highlands. Town planners have only recently started to apply this climatological characteristic. Faro was developed on a bench 150m above the floor of the Pelly River Valley in order to minimize the impact of extreme low winter temperatures. Ross River, on the valley floor but 55km from Faro is on the average 4°C colder in winter than Faro.

Inversions have a major impact on air pollution potential which will be discussed in chapter 13. As the air is very stable in an inversion layer vertical mixing is inhibited. This condition in association with light winds contributes to poor dispersion of pollutants.

Inversions that prevail in association with mountain wave-type flow generally damp out the wave with height. Inversions that top these waves often contain strong wind shear zones and in severe cases a rotor circulation can develop in the trough leeward of a mountain slope. Both of these phenomena can create dangerous clear air turbulence. Wave clouds found almost everywhere in Yukon commonly occur in layers the top of which has an inversion type lapse rate.

8.3 Mean Temperatures

Mean annual and mean monthly temperature patterns are depicted in Figures 8.7 to 8.19. The mean daily temperatures on a monthly basis for selected individual stations are shown in Figures 8.20 to 8.44. The map of mean daily temperature for the year (Figure 8.7) shows a general decrease in average temperature with latitude except the elevation and accentuated continental nature of climate in the lower Yukon basin results in a slight warm pocket there relative to other southern regions.

The winter charts for December, January and February and even November and March all show the strong effect of the Arctic inversion. Every mountain climatic region experiences generally higher mean temperatures than the basins, in particular the valley floors. The colder air common to the valley floors of the Yukon, Pelly, Porcupine, Peel and Liard River valleys is fully evident. The very mild temperatures on the windward marine slopes of the St. Elias-Coast Mountains are directly attributable to the relatively warm waters of the Gulf of Alaska. The cold spots noted to the west-southwest of Haines Junction are at the very high elevations of Mount Logan and Mount Hubbard which protrude up through the inversion layer to the colder air above.

January is generally the coldest month except along the Arctic slope as shown at Komakuk Beach and Shingle Point (Figures 8.35 and 8.40). The longer polar night this far north prevents any tempering effect from the sun to counteract the net radiation loss until February. This anomaly is not apparent on the monthly charts but is readily shown on the monthly graphs for the coastal stations. The January map (Figure 8.8) shows that temperatures are significantly lower in the valleys and generally at lower elevations of the basin climatic regions than over the highlands of the mountain regions. The average difference of 10 to 15°C regardless of latitude is mainly due to the winter inversion. The effect of latitude is also apparent as the mean temperatures for January are 5 to 10°C lower in the far north than in the south at relatively similar elevations.

By February the mean daily temperature pattern (Figure 8.9) shows less range in temperature with elevation which is mainly due to less intense inversion effects and greater solar insolation even though there is still a net radiation loss in February. This increase in solar energy is responsible for the general upward shifting of isotherms by about 5°C on the average from January values. Also there is less temperature contrast across southern Yukon reflecting the fact that solar heating is more effective at these latitudes. However the climatic basic regions are still appreciably colder than the mountain regions and mean temperatures still show a significant decrease northward with latitude.

In March (Figure 8.10) the increase in solar energy is realized more quickly in the south than in the far north as shown by the generally weak temperature gradient over the southern half of Yukon. The inversion effect is still very evident in the north particularly over the Northern Mountains and Arctic Slope climatic regions. In the south the normal negative lapse rate has returned as shown by the isotherm pattern over the St. Elias-Coast Mountains and Upper Yukon-Stikine Basin climatic regions.

By mid-April spring comes to the southernmost areas of Yukon (when mean temperature >0°C, Figure 8.6) and generally prevails over all of the south by the end of the month. However, the monthly mean temperature map (Figure 8.11) still has all areas below freezing for the month except for a tiny zone around Drury Creek. This anomaly is likely a result of the short period of record (7 years) at Drury Creek and the adjustment method used to estimate the "normal". April temperatures in the north are about 10°C higher than March values while in the south the warming is only 5°C. This reflects the rapid rate of increase of solar radiation in spring which takes a little longer to reach higher latitudes. Note that the only evidence of the lingering winter inversion is over the Richardson Mountains where mean temperatures are still higher than in the lowlands.

In May spring generally reaches all districts; yet, winter lingers in the extreme northern corner of Yukon in this month. While the monthly mean temperature (Figure 8.12) still shows occasional below-freezing spots over higher terrain in southwestern regions, sub-zero mean temperatures are pretty well relegated to the Mackenzie-Ogilvie Mountains, Northern Mountains and the Arctic Slope climatic regions. The basins and river valleys are now showing the warmest temperatures and the mountainous regions the coldest, the normal condition.

June, July and August thermal patterns (Figures 8.13-8.15) are all very similar. July is, on the average, the warmest month with some interior valley mean daily values exceeding 15°C and virtually all elevations below 4500m in the south and 3000m in the north exceeding 10°C. August is slightly cooler than July but on the whole warmer than June in the low areas and cooler at higher elevations.

In September sub-zero mean daily temperatures begin to creep down from the north by the third week. This ends the four to five month period (mid-April in the south/late May in the north to mid-September) with mean temperatures above freezing. The cooling influence is strong enough to show in the mean monthly temperatures (Figures 8.16) in the northern tip of Yukon and on the higher elevations of the Ogilvies and Northern Mountains climatic region. The warmer temperatures are inexorably forced southward and temperatures of greater than 5°C are confined to the Yukon and Liard River basins south of 65°N.

October's map (Figure 8.17) shows a very flat gradient of mean daily temperature which, except for the upper Yukon Valley and the highest terrain in the St. Elias Mountains, has only one isotherm wandering through the territory. The entire north half of Yukon lies between -3°C and -10°C. It is in situations like this that the placement of the isotherms is the least precise (section 4.2.2.). Winter has arrived (Figure 8.59) in all regions of Yukon by the last week of the month.

In November the Arctic inversion is common (Figure 8.18) with the Porcupine-Peel and Central Yukon Basin regions experiencing lower mean temperatures than the surrounding mountainous regions. All areas are now well below freezing. The relatively milder temperatures in the Arctic Slope region result from the influence of open water in the Beaufort Sea which is slightly above freezing.

December (Figure 8.19) is not as cold as January, but generally the isotherm pattern is similar. The Arctic inversion is stronger because of cold air drainage into the valley bottoms and the increasing net radiation loss.

The mean daily maximum and minimum temperatures for the year and quarterly are shown in Figures 8.45 to 8.54. The patterns generally follow those for mean daily temperature just discussed simply because the mean daily temperature is the average of the daily maximum and minimum. The annual mean maximum pattern (Figure 8.45) shows a fairly pronounced combined effect of latitude and topography. The range is from 4°C in the Whitehorse-Atlin area to near -6°C on the north coast. Warm southern basins with cold plateaux (normal vertical structure) change to cold basins and warmer elevations in the north (inversion influence in the longer winter). The annual mean daily minimum pattern (Figure 8.46) is similar to the daily and maximum patterns. The range of mean minimum is from -6.0°C in the south to -15.5°C in the north.

The quarterly values of mean daily maximum and minimum temperatures are depicted for January, April, July and October. January and July generally represent mid-season months except on the north coast, early February is more representative of mid-winter. April and October are truly winter months in northern Yukon rather than the commonly used "mid-spring" and "mid-fall" months utilized in climatologies for mid- and southern latitudes. They are used here to aid in comparisons to other regions on the continent. The duration of the seasons will be discussed further in section 8.7.1.

The January pattern of maximum temperatures (Figure 8.47) demonstrates the double effects – latitude and elevation. From south to north, maximum temperatures range from -15°C to -30°C and the winter inversion creates higher temperatures over the plateaux and highlands than in the valleys or lower basins. The mean minimum temperature pattern for January (Figure 8.48) shows a strong warm "pool" over the Ogilvie-Mackenzie Mountains region in contrast to the cold basins.

In April both the maximum pattern (Figure 8.49) and that for minimum temperature (Figure 8.50) show that the winter inversion has changed to a normal lapse rate in southern Yukon and the north is still in transition, an indication that spring still eludes northern latitudes.

The striking feature of both July maximum (Figure 8.51) and minimum (Figure 8.52) temperature patterns is the weak latitudinal effect because of the long or continuous hours of daylight. Values are very similar over the interior with the main gradient in coastal areas. For example, the mean minimum temperature range is only 6°C between the north coast and the southern Yukon boundary; yet over the interior basins from Old Crow to Dawson to Watson Lake, the range is just over 1°C.

In October the latitudinal temperature variation returns for both the maximum (Figure 8.53) and minimum temperatures (Figure 8.54). Temperatures are certainly lower than in the previous quarter, but the gradient is still quite flat.

Frequency and duration of daily maximum and minimum temperature will be examined in section 8.7.2.

8.4 Extreme Temperature

Temperature extremes for selected stations are shown on graphs in Figures 8.20 to 8.44 as well as the daily mean, maximum and minimum temperatures for each month. All stations show generally the same basic pattern, the differences being due to topography, latitude, and the proximity of large water bodies (section 5.2.2, 5.2.3 and 8.1). The north coast (Komakuk Beach and Shingle Point) reflects the maritime influence with somewhat lower extreme maxima in summer and higher extreme minima in winter than over the continental interior. For example, the extreme minimum at Shingle Point is -52.2°C in February compared to -59.4°C at Old Crow in January.

Usually the coldest month is January over the interior and February on the north coast but at a number of interior locations such as Aishihik, Anvil, Snag and Tuchitua (Figures 8.20, 8.21, 8.39, 8.42), the extreme minimum has occurred in February. Although the warmest weather is almost always in July, the extreme maximum is seldom in this month; most often it occurs in June and occasionally in August.

The extreme maximum for Yukon of 36.1°C occurred at Mayo while Snag holds the record of -62.8°C, the extreme minimum for the whole continent. Mayo's extreme low of -62.2°C rivals that for Snag but its extreme range of temperature of 98.3°C is the greatest in Yukon. Snag has recorded an extreme maximum of 31.7°C to give it a range of 94.5°C.

The severity of the extreme minimum temperature is not nearly as great at higher elevations within the winter inversion. For example, Faro (691m) has recorded -55.0°C in only 6 years of record while Anvil (1158m) has recorded only -46.1°C over 13 years of record (Figure 8.5). Note also that in winter the extreme maximum also increases with elevation. In summer when the normal negative lapse rate prevails, the extremes usually decrease with elevation as shown by the July curves for Faro-Anvil in Figure 8.5. The range between maximum and minimum temperatures including extremes generally decreases with elevation in winter when the air is stable which inhibits vertical mixing. The same is not always the case in summer when convection can mix the air thoroughly to above the 70-kPa level. This reduces or eliminates the difference in range with elevation as the maximum and minimum tend to decrease with elevation close to the same rate (July curves in Figure 8.5). It should be noted, however, that there is more variability in the lapse rate of minimum than maximum temperature in summer (section 8.1).

The Gumbel method (section 4.2.1) was used to determine the return periods of extreme temperature for Yukon locations given in Table 8.2 and 8.3. Values are derived for a number of stations that have data records for only 5 to 10 years. The user is cautioned that extrapolation beyond a length of time in the tables may produce erroneous results. The analysis of extreme maximum temperatures indicates that the most probable highest extreme in Yukon is estimated to be 40.2°C with a return period of 50 years occurring in the "little desert" at Carcross (Table 8.2). The analysis of extreme minimum temperature indicates that for a return period of 75 years, the most probable extreme minimum for stations in Table 8.3 is -68.4°C at Snag.

8.5 Temperature Variability

All stations have a fairly large mean daily temperature range (Table 8.4) with the greatest range generally in March. The rate of increase in global solar radiation (Figure 5.2) is most dramatic in this period and net radiation at Whitehorse becomes positive in about the third week in March. The rapidly increasing solar input on the one hand, and snow covered surfaces still enhancing high nocturnal radiation loss on the other, combine to maximize the daily temperature range.

The largest values are in the Central Yukon Basin climatic region where the climate is the most continental, therefore experiencing the greatest variation. For example, Beaver Creek has a range of 19.1°C and Snag shows 19.0°C, both in March. Ross River at 15.3°C for the year has the greatest annual range as well as relatively high values throughout the year. It is believed that local cold air drainage and pooling on the floor of the Pelly River around Ross River and the dryness of the area contribute to the range in all seasons.

There is greater variability in time of occurrence of lowest seasonal range but it is most often in October or November. The locations that generally have the lowest range are at high elevations (Keno Hill, Boundary) or are under a maritime influence (Komakuk Beach, Shingle Point). Values usually decrease with elevation as the annual range drops from 12.1°C at Mayo (504m) to 9.3°C at Elsa (814m) to 7.0°C at Keno Hill (1472m).

The foregoing gives an indication of the variability of temperature on a given day. For variation from day-to-day or longer periods the standard deviation (sections 4.2.2. and 6.2) of temperature is the best indicator.

The standard deviations for daily temperature for selected Yukon stations are given in Table 6.1 and the values over Yukon relative to the rest of Canada are depicted in Figure 6.4. The deviations in Yukon in January are the greatest in the country particularly in the Central Yukon Basin climatic region. Deviations in January are near 7°C at a number of locations, including Mayo, Ft. Selkirk, Faro, Carcross and Carmacks and some are greater than this in February. At Mayo in February the temperature has ranged from 12.2°C to -62.2°C – a range of 74.4°C; the range between Mayo's extreme minimum and extreme maximum is 98.3°C. As mentioned in section 4.2.2, large standard deviations indicate that values of a parameter, such as temperature, that are significantly different from the mean can occur almost as often as the mean to create "surprising/unusual" weather quite frequently.

In summer, standard deviations in Yukon are similar to those in other regions in Canada which indicates less variability in this season, mainly due to the long or continuous hours of daylight. Note that some of the largest values (Table 6.1) in summer are on the north slope where a change from onshore to offshore wind, or the reverse, can quickly create a dramatic change in temperature. In central Yukon in July the standard deviations are among the lowest in the territory, in sharp contrast to winter. This means that summer temperatures are usually close to normal values.

8.6 Mean Temperature Change

Temperature variations from year-to-year for those stations with a period of record of 20 years or more were graphed. One station, Carcross with records back to 1907 was not done because of frequent gaps in the record. The annual and ten-year running means for the mean, mean maximum and mean minimum temperatures for eleven stations are shown in Figures 8.55 to 8.65. Ten-year averages were chosen for the running means to smooth out annual variability and to better indicate long-term trends.

There was a general warming trend in North America early in this century which peaked in the 1940's then a cooling until the early 1970's. Recent trends in Yukon generally show a fall in temperatures in the early 1950's, a brief warming to the late 1950's, a general cooling in the early 1970's which continues in most areas to 1981. For those stations with long-term records the present temperatures in general, are approaching but have not yet reached those of the mid-1940's. Whitehorse and Mayo are still a little less than a degree cooler while Dawson, Watson Lake and Teslin are 1°C to 1.5°C cooler. Haines Junction, however, is about 0.5°C warmer. Climatic change will be discussed in chapter 14.

8.7 Duration of Seasons and Temperature

8.7.1 *Duration of Seasons*

The lengths of the seasons in Yukon differ from other regions in Canada mainly because of latitude. Winter is commonly defined as the period when the mean daily temperature is below freezing (0°C) and summer when the mean daily temperature is above 10°C. According to these definitions, the longest season by far is winter, ranging from 176 days (48% of year) at Carcross to 256 days (70%) at Komakuk Beach (Table 8.5). The definition of season length based on fixed threshold mean daily temperature is fine for comparative purposes, but it is not totally satisfactory for northern latitudes.

The patterns of average beginning, duration and ending of winter are depicted in Figures 8.67 to 8.69. The earliest onset date is at Komakuk Beach (21 September) and the latest at Carcross (23 October). One notable fact is that the beginning of winter (Figure 8.67) fairly explodes southward in northern Yukon (N of 64°N) as it spreads from Komakuk beach to Old Crow and Klondike in just three days. It then takes about a month to engulf Carcross by 23 October. According to the above definition, winter lasts six months in the south from early-mid-October to mid-late-April and about eight and a half months at Komakuk Beach.

There is a much more uniform progression northward of the onset of spring (Figure 8.69). An indication of the duration of spring and fall at selected stations in Yukon can be estimated from Figure 8.6. The graph shows that spring begins about the same time at Whitehorse and Dawson then starts more uniformly northward.

The transition periods of spring and fall last about a month to a month and one half (period with mean daily temperature between 0°C and 10°C). The traditional classification of April and October being the mid-season spring and fall months does not really apply in Yukon as it does in mid-latitudes. Spring and fall months in southern Yukon are usually May and September respectively and each changes by about a month on the north coast.

The summer season extends over June, July and August in southern regions but lasts about a month and a half on the Yukon north coast. A day/month matrix of mean daily temperatures for selected stations was scanned to estimate the length of the summer season as given in Table 8.6.

Although this procedure is not totally satisfactory, it does give a clear indication of the variability within Yukon. In the Upper Yukon-Stikine, Central Yukon, and Liard Basin climatic regions a number of valley stations have summers with a mean duration of 103 or 104 days, yet at Aishihik and Haines Junction the summer season is significantly shorter. The close proximity of the Ice Fields to Haines Junction is likely the primary cause of their short summer. The average length of summer on the north coast shown as 50 days at Komakuk Beach is reasonable compared to the length of winter in Table 8.5. It should be noted, however, that at Komakuk quite frequent spells with mean daily temperature less than 10°C are experienced in summer.

8.7.2 *Duration of Temperature*

The frequency of specified duration ranges for specified conditions of daily maximum temperature as well as specified daily minimum temperatures by months for selected stations are given in Tables 8.9 to 8.39. Columns 1 to 4 in both tables give the number of occurrences in duration ranges 1 to 3 days, 4 to 7 days, 8 to 14 days, and greater than or equal to 15 days. Column 5 gives the longest duration of the temperature within the specified condition. For example, at Aishihik (Table 8.9) in March for maximum temperature condition 14 (Daily maximum temperature in the 1 to 5°C range) there were 53 occurrences of 1 to 3 days duration, 17 occurrences of 4 to 7 days, and 3 occurrences of 8 to 14 days duration – the longest duration of days with maximum temperature within the condition 1 to 5°C being 10 days.

Although the first table in each set is for daily maximum temperature, the "curve" of the numbers in this table shows the general temperature trend throughout the year. The "spread" of the numbers show the monthly variability of temperature (e.g. at Aishihik, January maximum temperatures vary within conditions 5 to 15 or -44°C to +10°C – a 54°C range – while July maxima vary only from 6°C to 30°C – a 24°C range).

The second table in each set (Tables 8.9 to 8.39) gives the frequency of specified daily minimum temperature conditions within specified duration ranges. The duration ranges are the same as for maximum temperature. The minimum temperature conditions 1 to 5 are for specific minimum temperature of ≤40°C, -30 to -39°C, -20 to -29°C, -10 to -19°C and 0 to -9°C respectively. For example, at Whitehorse (Table 8.39), in January for minimum temperature condition 1 (< -40°C), there were 47 occurrences of 1 to 3 days, 11 occurrences of 4 to 7 days, and 2 occurrences of 8 to 14 days for a total number of occurrences of 60 for minimum temperatures < -40°C. The longest duration of all these occurrences was 10 days. Kendrew and Kerr (1955) defined arctic days as those with minimum temperature < -40°C, which is condition 1 in the above tables.

8.7.3 *Duration of Cold and Warm Spells*

Cold spells are common in any Yukon winter, and warm spells do occur in summer. Essentially the same synoptic regime creates both conditions and it is described in section 12.3. The patterns are illustrated in Figures 12.10 and 12.11.

The frequency and duration for cold spells can be estimated from both sets in Tables 8.9 to 8.39, but results will vary with the criterion utilized. For example, at Mayo (Figure 8.26), where the greatest range in temperature for Yukon is experienced, the daily maximum temperature in January did not exceed -40°C on a total of 115 occasions with the longest duration of various temperature conditions ranging from 2 to 10 days – the absolute longest being 10 days when the -45°C to -49°C condition prevailed. On the other hand, in January the daily minimum temperature was equal to or less than -40°C on a total of 137 occasions of which 3 lasted 15 days or more and the longest duration was 24 days. The pattern of daily maximum and minimum temperature over the period of the record cold spell at Snag is depicted in Figure 8.66. The gradual drop in the 10 day period prior to the record demonstrates how local cold air drainage and continuing net radiation loss under calm conditions intensifies the cold. Note also the rapid rise in temperature when the cold spell ends which is quite common in Yukon.

The table for daily maximum temperature must be used to determine frequency and duration of warm spells. For example, at Mayo in summer it can be seen from Table 8.28 that condition 20 (daily maximum temperature > 30°C) occurs more often in July (15 occurrences) yet the longest hot spell has been 5 days in June compared to 4 in July. As mentioned in section 8.4, July is on the average the warmest month but more hot spells or extremes occur in June. An inspection of the tables for daily maximum temperature readily shows that winter cold spells are more frequent and last longer than summer hot spells.

8.8 Frost and Freeze-Thaw Cycles

Subfreezing temperatures have occurred at all Yukon stations in every month with the exception of Watson Lake in July. The frequency and duration of minimum temperature condition 5 (daily minimum temperature <0°C) in Tables 8.9 to 8.39 can give an indication of the frequency and duration of frost periods in any month. Table 8.38 shows no frost periods at Watson Lake in July, but 20 occurrences in June with the longest duration being 4 days.

The averages and extremes of frost-free periods at selected stations is given in Table 8.8. The range is from an average of 93 days at Watson Lake to only 16 days at

Sheldon Lake. Note the great variability from year-to-year as the extremes at Watson Lake vary from 126 days down to 45 – under half of the average. Haines Junction experiences one of the shortest frost-free periods in Yukon with an average of only 21 days – in at least one year it did not have a single day free of frost. Cold air drainage from the permanent ice and snow fields in the St. Elias Mountains and pooling of this air over Haines Junction is believed to be mainly responsible for the frequent occurrence of summer frost.

As minimum temperature usually decreases with elevation in summer, the frequency of frost should increase with elevation. Faro (694m) has an average frost-free period of 90 days while Anvil (1158m) has on the average only 46 days frost-free. There are exceptions to this rule as shown by a comparison between Mayo and Elsa – the higher station has the longest frost-free season. This only indicates that factors other than elevation can be more important in the determination of frost occurrences. Faro which is located on a bench about 150m above the floor of the Pelly River Valley has a frost-free period averaging 90 days whereas Ross River on the valley floor but 55km upstream is free of frost only 25 days. These examples simply point out that the occurrence of frost varies greatly from place to place. A local "frost hollow" (section 8.1) can exist a short distance from a location with a significantly higher frost-free period.

A number of factors affect the occurrence of summer frost. Some that enhance its formation are topographical such as a low bowl-shaped (concave) location – a "frost hollow"; permafrost or proximity of glaciers or snow fields; clear skies at night, and low relative-humidity (dew point below freezing). Factors that deter frost include proximity of large water bodies which store sensible heat and create low cloud or fog particularly in late summer or fall; windy conditions which spread nocturnal cooling through a deep layer rather than having it almost all realized at the surface as in calm conditions; vegetation which can restrict cold air drainage on a slope so valleys with forested slopes can have higher minimum temperatures than if the vegetation had been cleared by cutting or burning. Most of the foregoing are discussed in more detail by Janz and Storr (1977).

A freeze-thaw cycle is usually defined as a change in temperature from -2°C to +1°C and Keeble (1971) has discussed the importance of such cycles in the weathering process and breakdown of rocks. The greatest freeze-thaw action should occur when the daily maximum temperature is above freezing and the minimum below freezing. Such conditions are common at valley stations in southern Yukon in April and October, in May and September in the north and in June on the north slope. The period shifts toward summer at high elevations. This trend is shown at Faro (694m) and Anvil (1158m) where the former has the most frequent cycles in April and October while at Anvil the cycle extends into May and September. At high elevations in the St. Elias-Coast Mountains region, the greatest activity is likely in June and July with little action above the 3000m level where the ambient temperature rarely exceeds freezing.

8.9 Degree-Day Indices

A degree-day is defined as a measure of the departure of temperature for a day from some reference temperature. For example, negative departures from 18°C may be used for heating requirements for a residential building and positive departures from 18°C for air conditioning requirements.

The basic formula for the daily departure is:

$$\text{Heating degree-day (HDD)} = 18 - (\text{maximum} + \text{minimum})/2$$

These are computed for each day and totalled for periods of weeks, months, seasons or the year. Normals can be determined as with temperature. For each additional heating degree-day more fuel is needed to maintain comfortable indoor temperatures, such that a day with 30 HDD would require three times as much fuel as a day with 10 HDD, assuming similar meteorological conditions such as wind speed and cloudiness. Other reference temperatures of 10°C, 12°C, and 15°C have been used to estimate energy needs in factories or warehouses where less heat is usually required.

Other degree-day indices routinely used are:

(a) Growing degree-days (GDD, above a base of 5°C but many base temperatures can be used).
(b) Thawing degree-days (TDD, departures above 0°C).
(c) Freezing degree-days (FDD, departures below 0°C, in which temperature departures above 0°C must be subtracted from the total below freezing).

Mean annual total HDD based on the 18°C reference temperature as well as FDD, TDD and GDD for selected Yukon stations are listed in Table 8.7. The change in HDD with latitude over Yukon is illustrated in Figure 8.70 with the values increasing from near 7000 in the south to more than 10000 on the north slope. The stations at higher elevations accumulate more HDD in summer than valley locations, but the reverse is true in winter due to the inversion effects. Higher temperatures in the upper inversion reduce the HDD accumulation which influences the annual pattern. The area of lower values in the south extends over stations at higher elevations such as at Anvil, Hill and Elsa.

FDD accumulations are low or absent in summer except on the north slope. On an annual basis the greatest values are on the Old Crow Flats (Figure 8.71), but those at medium elevations over the Ogilvie Mountains are similar. The winter inversion effect is strong enough at high stations such as Anvil, Keno Hill and Elsa to influence the annual pattern.

The annual patterns for TDD and GDD are similar (Figures 8.72 and 8.73), the main accumulation being in summer. Of course the season of accumulation of TDD is longer than for GDD, the increase in threshold from 0°C to 5°C reduces the accumulation of degree-days by about one half. The highest values are in the valleys where the warmest summer weather occurs and around Watson Lake which has the longest frost-free period in Yukon.

In agriculture, degree-days are used in nearly every stage of planning and operations. For plant growth, a base temperature of 5°C is generally used, although the base varies for each plant species and, in fact, varies throughout the life of the plant from germination to maturity. Degree-days are often used for scheduling planting times and in predicting various plant growth stages. By accumulating them throughout the growing season, it is possible to forecast harvest dates.

Eley and Findlay (1977) conclude that no extensive areas in Yukon have a suitable climate for subsistence agriculture. However, they found that narrow bands of class 2 or 3 land exist along most major rivers and a significant area with class 2 rating exists around Watson Lake. Class 3 will produce several cool season vegetables (no prolonged temperatures above 20°C, an indication of which may be determined from the analysis of daily maximum temperatures in Tables 8.9 and 8.39). The selection of vegetables includes beets*, broad beans*, brussel sprouts, cabbages, carrots*, cauliflower*, kohlrabi, parsnips, potatoes*, radishes, rutabagas, sprouting broccoli, (* denotes frost-susceptible species growing in microclimatically favourable areas). Class 3 forage crops include alfalfa, alsike, clover, bromegrass, red clover, ryegrass and sweet clover; grains are barley and oats; there are no cultivated fruits. Class 2 has a greater selection than class 3, including a broader choice of cool season vegetables and forage crops plus some fruits such as currents, saskatoon berries and strawberries. According to Findlay and Treidl (1977) southeastern Yukon has the longest growing season of any sub-polar region.

TABLE 8.1

Mean Lapse Rates (°C/100 m) for Selected Stations

LAYER (kPa)	WHITEHORSE	FORT NELSON	INUVIK	LAYER (kPa)	WHITEHORSE	FORT NELSON	INUVIK
JANUARY				JULY			
sfc-85	.39	-.59	.75	sfc-85	-.05	-.15	-.24
85-70	-.17	-.06	-.24	85-70	-.62	-.70	-.61
70-50	-.60	-.59	-.55	70-50	-.61	-.62	-.62
50-30	-.59	-.60	-.56	50-30	-.75	-.75	-.74
30-20	-.03	-.03	-.004	30-20	-.20	-.24	-.08
APRIL				OCTOBER			
sfc-85	-.11	-.08	.39	sfc-85	-.11	.14	-.09
85-70	-.59	-.65	-.42	85-70	-.54	-.61	-.38
70-50	-.64	-.64	-.61	70-50	-.66	-.64	-.63
50-30	-.63	-.64	-.59	50-30	-.68	-.72	-.67
30-20	.03	.02	.12	30-20	-.06	-.17	.02

Period 1961-1970

TABLE 8.2

Expected Annual Extreme Maximum Temperature for Various Return Periods

	RETURN PERIODS (YEARS)								
STATION	2	5	10	15	20	25	30	50	100
Aishihik	26.0	27.6	28.7	29.3	29.8	30.1	30.4	31.1	
Anvil	25.7	28.2	29.8	30.8	31.4	31.9			
Beaver Creek	29.0	31.4	33.1	34.0	34.6				
Boundary	25.3	27.1	28.3	29.0					
Braeburn	29.0	30.7	31.8	32.4					
Burwash	26.4	28.8	30.4	31.3	31.9	32.4	32.8		
Carcross	28.7	32.4	34.8	36.2	37.2	37.9	38.5	40.2	
Carmacks	29.4	31.6	33.1	33.9	34.5	34.9	35.3		
Dawson	29.6	31.6	32.8	33.5	34.0	34.4	34.7	35.6	36.8
Drury Creek	27.6	31.2	33.5	34.8					
Elsa	26.6	30.2	32.6	33.9	34.9	35.6	36.2		
Faro	29.3	32.0	33.7						
Fort Selkirk	29.8	31.8	33.1	33.9	34.4	34.8	35.1	36.0	
Haines Junction	27.9	29.6	30.8	31.4	31.9	32.2	32.5	33.3	
Johnsons Crossing	28.4	30.6	32.1	32.9	33.5	33.9	34.3		
Keno Hill	23.1	26.2	28.2	29.4					
Klondike	24.8	26.0	26.9	27.3					
Kluane	25.8	27.0	27.8	28.3	28.6				
Komakuk	24.2	26.7	28.4	29.4	30.1	30.6	31.0	32.2	
Mayo	29.4	31.5	32.8	33.6	34.1	34.5	34.8	35.8	37.0
Old Crow	28.5	31.1	32.8	33.8	34.5	35.0	35.4		
Quiet Lake	Insufficient Data								
Ross River	29.0	31.7	33.5	34.5	35.2	35.8			
Sheldon Lake	Insufficient Data								
Shingle Point	27.0	28.3	29.2	29.7	30.1	30.4	30.6	31.2	
Snag	28.5	30.3	31.5	32.2	32.6	33.0	33.3	34.1	
Swift River	27.3	29.4	30.7	31.5	32.0	32.4	32.8		
Teslin	27.7	29.7	31.0	31.7	32.2	32.6	32.9	33.8	
Tuchitua	28.2	30.6	32.0	33.1	33.7	34.2	34.6		
Watson Lake	29.0	30.8	32.0	32.7	33.2	33.6	33.9	34.7	
Whitehorse	28.4	30.4	31.7	32.4	32.9	33.3	33.6	34.5	

TABLE 8.3

Expected Annual Extreme Minimum Temperature for Various Return Periods

	RETURN PERIODS (YEARS)							
STATION	**5**	**10**	**20**	**30**	**40**	**50**	**75**	**100**
Aishihik	-51.1	-53.5	-55.9	-57.3	-58.2	-59.0	-60.3	
Anvil	-45.3	-47.9	-50.3					
Beaver Creek	-53.7	-55.6	-57.5					
Boundary	-45.1	-46.2						
Braeburn	-54.3	-56.3						
Burwash	-52.3	-54.6	-56.7	-58.0	-58.9			
Carcross	-47.1	-50.3	-53.4	-55.2	-56.4	-57.4	-59.1	
Carmacks	-55.2	-57.5	-59.7	-61.0	-61.8			
Dawson	-52.5	-55.0	-57.4	-58.8	-59.7	-60.5	-61.8	-62.8
Drury Creek	-53.5	-56.6						
Elsa	-47.3	-50.9	-54.3	-56.2	-57.6			
Faro	-54.4	-58.7						
Fort Selkirk	-57.5	-59.5	-61.4	-62.5	-63.3	-63.9	-64.9	
Haines Junction	-50.1	-52.2	-54.2	-55.3	-56.2	-56.8	-57.9	
Johnsons Crossing	-49.1	-51.3	-53.3	-54.5	-55.3			
Keno Hill	-43.4	-48.5						
Klondike	-49.1	-51.2						
Kluane	-45.7	-48.1	-50.4					
Komakuk	-45.9	-47.6	-49.3	-50.2	-50.9	-51.4	-52.3	
Mayo	-55.7	-58.3	-60.9	-62.4	-63.4	-64.2	-65.7	-66.7
Old Crow	-54.5	-56.7	-58.9	-60.1	-61.0			
Quiet Lake	Insufficient Data							
Ross River	-58.2	-60.7	-63.1					
Sheldon Lake	Insufficient Data							
Shingle Point	-47.5	-49.6	-51.5	-52.6	-53.4	-54.0	-55.1	
Snag	-57.3	-60.3	-63.1	-64.8	-65.9	-66.8	-68.4	
Swift River	-49.7	-52.6	-55.4	-57.0	-58.2			
Teslin	-47.3	-49.7	-52.0	-53.3	-54.2	-54.9	-56.2	
Tuchitua	-54.3	-57.3	-60.2	-61.8	-63.0			
Watson Lake	-52.9	-55.4	-57.8	-59.1	-60.1	-60.9	-62.2	
Whitehorse	-46.5	-48.4	-50.3	-51.4	-52.1	-52.7	-53.8	

TABLE 8.4

Mean Daily Range of Temperature by Month

STATION	J	F	M	A	M	J	J	A	S	O	N	D	ANN.
Aishihik	11.5	13.9	16.4	13.2	12.9	13.0	12.6	12.8	11.8	11.4	10.9	10.8	12.7
Anvil	9.8	10.5	12.0	10.9	11.1	13.0	12.5	11.9	10.5	9.7	9.7	9.8	10.9
Beaver Creek	10.1	14.6	19.1	14.9	13.9	14.8	13.6	14.2	13.3	12.8	10.9	9.5	13.4
Boundary	7.1	8.1	9.0	10.0	7.9	9.0	8.7	5.8	6.5	6.0	6.0	7.2	
Braeburn	11.4	13.8	15.7	12.5	13.6	14.5	14.4	14.4	12.0	10.2	11.0	10.7	12.9
Burwash	13.6	14.6	17.7	13.8	13.1	14.5	13.6	13.5	12.8	11.5	11.8	12.5	13.6
Carcross	9.7	11.0	13.0	11.5	12.0	12.1	12.5	13.0	10.9	8.3	8.1	8.6	10.9
Carmacks	9.7	12.9	17.0	13.8	14.1	15.2	14.4	14.5	13.0	9.8	8.1	9.7	12.7
Clinton Creek	7.6	8.9	11.7	11.8	11.8	13.0	11.8	12.6	10.8	7.5	7.0	5.1	10.0
Dawson	7.1	9.4	14.8	14.1	13.7	14.2	13.5	12.9	12.9	7.0	6.7	7.2	10.9
Drury Creek	10.4	12.8	14.7	13.1	14.0	14.6	13.6	14.0	12.7	9.6	10.1	11.2	12.6
Elsa	6.8	7.7	7.7	11.0	10.4	11.3	11.6	11.3	10.3	7.7	6.9	7.4	9.3
Faro	8.1	10.2	13.3	12.5	12.5	12.8	12.6	13.1	11.1	7.8	6.8	7.8	10.7
Fort Selkirk	11.0	15.3	18.9	14.6	14.6	15.6	14.7	15.0	13.9	10.4	10.2	10.3	13.7
Haines Junction	11.6	11.1	16.2	13.0	14.5	15.6	14.9	15.5	14.0	11.6	11.3	11.5	13.7
Johnsons Crossing	9.6	11.5	13.5	12.7	14.2	15.4	14.4	14.6	11.1	8.2	7.2	8.5	11.6
Keno Hill	6.0	6.4	9.0	8.2	7.4	8.1	8.4	6.7	5.8	6.4	5.8	5.5	7.0
Klondike	10.5	12.5	12.9	13.3	12.2	13.3	13.6	13.0	11.7	10.4	10.8	11.0	12.1
Kluane	12.0	13.8	14.5	11.1	12.2	13.1	12.6	12.5	11.1	9.6	9.8	10.5	11.9
Komakuk	9.2	8.5	8.0	8.7	6.2	6.5	8.9	7.8	6.2	6.3	8.0	8.3	7.7
Mayo	8.5	12.7	15.1	12.7	13.3	14.1	14.0	13.7	11.6	8.6	9.4	10.2	12.1
Old Crow	9.6	9.8	11.2	13.0	11.0	12.7	12.7	11.8	9.9	8.5	8.3	9.6	10.5
Quiet Lake					12.5	13.9	13.5	12.7	11.8				
Ross River	12.5	17.2	14.8	11.3	17.0	16.5	16.8	16.8	10.5	12.7	12.2	12.7	15.3
Sheldon Lake						16.6	16.3	15.7	14.1				
Shingle Point	9.6	8.2	8.6	9.1	9.3	8.6	9.9	9.7	6.6	5.9	7.9	8.6	8.3
Snag	10.5	14.5	19.0	15.4	14.2	14.5	13.9	14.6	13.6	11.0	10.2	10.0	12.2
Swift River	10.6	11.9	13.3	12.1	12.0	13.6	12.9	13.1	10.8	8.1	8.9	9.9	11.5
Teslin	9.6	11.3	12.6	11.5	12.9	13.5	12.9	12.6	11.0	8.3	7.8	8.6	11.1
Tuchitua	8.8	15.5	18.8	14.8	14.1	14.4	14.6	14.9	13.2	10.7	9.9	10.2	8.5
Watson Lake	8.7	13.3	15.9	13.1	12.8	12.5	12.2	12.3	10.6	11.0	9.4	9.8	11.8
Whitehorse	8.6	9.8	11.7	10.7	12.1	12.9	12.4	11.9	9.8	7.5	8.0	8.2	10.3

TABLE 8.5

Beginning, Duration, and Ending of Winter

STATION	MEAN DATE BEGINNING OF WINTER	MEAN DATE END OF WINTER	MEAN DURATION OF WINTER (DAYS)
Aishihik	October 6	May 2	208
Anvil	October 3	April 29	208
Beaver Creek	September 29	April 24	207
Boundary	September 25	May 1	218
Braeburn	October 18	April 19	183
Burwash	October 3	April 24	203
Carcross	October 23	April 17	176
Carmacks	October 17	April 17	182
Dawson	October 6	April 21	197
Drury Creek	October 18	April 22	186
Elsa	October 1	April 24	205
Faro	October 4	April 17	195
Fort Selkirk	October 9	April 21	194
Haines Junction	October 14	April 21	189
Johnsons Crossing	October 18	April 21	185
Keno Hill	September 27	May 6	221
Klondike	September 23	May 3	222
Kluane	October 16	April 21	187
Komakuk	September 21	June 4	256
Mayo	October 8	April 17	191
Old Crow	September 23	May 13	232
Ross River	October 3	April 24	203
Sheldon Lake	October 5	April 26	203
Shingle Point	September 22	May 29	249
Snag	October 4	April 23	201
Swift River	October 17	April 22	187
Teslin	October 18	April 21	185
Tuchitua	October 14	April 21	189
Watson Lake	October 19	April 16	179
Whitehorse	October 18	April 15	179

TABLE 8.6

Beginning, Duration, and Ending of Summer

STATION	MEAN DATE BEGINNING OF SUMMER	MEAN DATE END OF SUMMER	MEAN DURATION OF SUMMER (DAYS)
Aishihik A (1943-1946)	June 5	August 24	81
Dawson (1951-1978)	May 22	September 1	103
Dawson A (1979-1980)	Insufficient Data		
Faro (1972-1976)	May 26	August 31	98
Haines Junction (1951-1980)	June 1	August 29	90
Komakuk Beach A (1958-1980)	July 1	August 29	50
Mayo A (1951-1980)	May 24	September 4	104
Old Crow (1952-1980, 18 yrs missing)	June 1	August 25	86
Watson Lake A (1951-1980)	May 27	September 7	104
Whitehorse A (1951-1980)	May 24	September 3	103

TABLE 8.7

Mean Annual Freezing, Thawing, Heating, and Growing Degree-Days for Selected Stations

STATION	FREEZING	THAWING	GROWING	HEATING	STATION	FREEZING	THAWING	GROWING	HEATING
Aishihik	2901.9	1312.6	595.7	8144.5	Keno Hill	2393.0	1060.2	444.4	7766.8
Anvil	2325.3	1134.4	455.5	7430.0	Klondike	M	M	M	M
Beaver Creek	3585.4	1451.9	741.0	8366.0	Kluane	2336.4	1436.7	668.3	7183.8
Boundary	M	M	M	M	Komakuk	4445.2	596.2	192.7	10228.9
Braeburn	2632.8	1568.3	750.8	7451.5	Mayo	3239.4	1798.1	983.0	7987.5
Burwash	2902.6	1413.3	647.1	8040.0	Old Crow	4752.2	1216.3	664.6	10098.7
Carcross	2021.9	1602.9	731.5	6891.7	Quiet Lake	M	M	M	M
Carmacks	2981.1	1725.6	909.6	7638.4	Ross River	3526.3	1537.9	638.3	8437.0
Clinton Creek	M	M	M	M	Sheldon Lake	M	M	M	M
Dawson	3345.6	1799.2	1014.8	8135.9	Shingle Point	4293.0	867.1	398.7	9925.9
Dawson A	3098.3	1535.3	996.5	7684.3	Snag	3666.5	1551.2	815.4	8668.4
Elsa	2869.5	1518.0	810.3	8245.9	Swift River	2175.1	1298.5	566.8	7175.9
Faro	2795.3	1727.3	925.2	7475.5	Teslin	2241.7	1577.3	800.7	7141.9
Fort Selkirk	3371.0	1748.4	939.0	8143.9	Tuchitua	2932.5	1397.2	660.5	7884.1
Haines Junction	2553.3	1454.1	669.6	7638.1	Watson Lake	2996.0	1786.2	973.2	7749.3
Johnsons Crossing	2267.4	1581.1	756.9	6971.2	Whitehorse	2112.2	1763.8	897.1	1970.4

TABLE 8.8

Frost

STATION	AVERAGES BASED ON 1951-80 PERIOD OF RECORD				EXTREMES BASED ON FULL PERIOD OF RECORD										
						LAST FROST (SPRING)		FIRST FROST (FALL)		LONGEST			SHORTEST		
	YEARS	FROST-FREE PERIOD (DAYS)	LAST FROST (SPRING)	FIRST FROST (FALL)	YEARS	EARLIEST	LATEST	EARLIEST	LATEST	LAST FROST (SPRING)	FIRST FROST (FALL)	NO. OF DAYS	LAST FROST (SPRING)	FIRST FROST (FALL)	NO. OF DAYS
Aishihik A	16	47	Jun 23	Aug. 10	24	May 30	Jul 13	Jul 16	Aug 31	Jun 17	Aug 31	74	Jun 29	Jul 25	25
Anvil	12	46	Jun 21	Aug 7	12	May 24	Jul 11	Jul 16	Aug 25	Jun 8	Aug 24	76	Jul 11	Jul 16	4
Beaver Creek	9	50	Jun 22	Aug 12	9	Jun 11	Jul 5	Aug 2	Aug 24	Jun 12	Aug 10	58	Jun 30	Aug 2	32
Braeburn	6	34	Jun 28	Aug 2	6	Jun 15	Jul 5	Jul 16	Aug 25	Jul 5	Aug 25	50	Jul 2	Jul 17	14
Burwash A	14	30	Jul 1	Aug 1	14	Jun 19	Jul 15	Jul 16	Aug 20	Jun 29	Aug 19	50	Jul 7	Jul 19	11
Carcross	8	58	Jun 19	Aug 17	40	May 11	Jul 15	Jul 17	Sep 29	May 11	Sep 29	140	Jul 15	Jul 23	7
Carmacks	19	74	Jun 6	Aug 20	20	May 23	Jun 24	Jul 16	Sep 16	May 23	Sep 2	101	Jun 24	Jul 25	30
Clinton Creek	12	67	Jun 9	Aug 16	12	May 24	Jun 29	Jul 20	Sep 5	May 25	Sep 3	100	Jun 29	Jul 21	21
Dawson	29	91	May 28	Aug 28	82	May 12	Jul 14	Jul 19	Sep 17	May 14	Sep 17	125	Jun 21	Jul 19	27
Dawson A	5	64	Jun 13	Aug 17	5	May 23	Jul 3	Jul 23	Aug 29	Jun 16	Aug 29	73	Jul 3	Aug 24	51
Dempster	8	31	Jun 29	Jul 31	8	Jun 17	Jul 7	Jul 17	Aug 23	Jul 2	Aug 23	51	Jul 7	Jul 23	15
Drury Creek	8	56	Jun 17	Aug 13	8	Jun 8	Jul 3	Jul 20	Aug 25	Jun 8	Aug 25	77	Jun 25	Jul 20	24
Elsa	13	86	May 29	Aug 24	11	May 5	Jul 15	Jul 20	Sep 15	May 5	Sep 15	132	Jul 15	Jul 20	4
Faro	8	90	May 27	Aug 26	8	May 22	Jun 9	Aug 18	Sep 8	May 22	Sep 8	108	May29	Aug 18	80
Fort Selkirk	27	61	Jun 16	Aug 17	27	May 23	Jul 13	Jul 19	Sep 5	May 23	Aug 25	93	Jul 13	Aug 9	26
Haines Junction	30	21	Jul 6	Jul 26	36	Jun 16	Jul 15	Jul 16	Aug 19	Jun 16	Aug 19	63	Jul 15	Jul 16	0
Johnsons Crossing	17	45	Jun 23	Aug 8	17	Jun 6	Jul 6	Jul 16	Aug 31	Jun 21	Aug 31	70	Jun 29	Jul 16	16
Keno Hill	6	55	Jun 22	Aug 17	6	Jun 11	Jul 4	Jul 24	Aug 31	Jun 15	Aug 31	76	Jul 2	Jul 24	21
Kluane Lake	8	59	Jun 19	Aug 18	8	Jun 9	Jul 3	Jul 22	Aug 31	Jun 9	Aug 31	82	Jul 3	Jul 22	18
Komakuk Beach	22	28	Jul 2	Jul 31	22	Jun 20	Jul 15	Jul 18	Sep 1	Jul 1	Sep 1	61	Jul 14	Jul 18	3
Mayo A	29	71	Jun 8	Aug 19	57	May 14	Jul 13	Jul 20	Sep 11	May 25	Sep 9	106	Jul 13	Aug 2	19
Ogilvie River	6	45	Jun 17	Aug 2	6	May 28	Jul 2	Jul 17	Aug 22	Jun 19	Aug 22	63	Jun 19	Jul 18	28
Old Crow A	9	63	Jun 14	Aug 17	9	May 22	Jul 1	Jul 31	Sep 1	Jun 10	Sep 1	82	Jun 28	Aug 6	38
Quiet Lake	11	62	Jun 15	Aug 17	11	May 30	Jul 15	Jul 16	Sep 8	Jun 8	Sep 8	91	Jul 15	Jul 16	0
Ross River	13	25	Jul 1	Jul 27	13	Jun 9	Jul 14	Jul 16	Aug 21	Jul 3	Aug 21	48	Jul 10	Jul 16	5
Sheldon Lake	8	16	Jul 8	Jul 25	8	Jun 23	Jul 15	Jul 17	Aug 18	Jul 5	Aug 18	43	Jul 15	Jul 17	1
Shingle Point A	23	49	Jun 26	Aug 15	23	Jun 8	Jul 12	Jul 18	Sep 3	Jun 8	Sep 3	86	Jul 10	Jul 18	7
Snag A	16	51	Jun 19	Aug 10	23	May 29	Jul 13	Jul 18	Aug 22	May 29	Aug 20	82	Jul 10	Jul 31	20
Stokes Point	5	31	Jul 3	Aug 4	5	Jun 21	Jul 15	Jul 23	Aug 24	Jul 3	Aug 24	51	Jul 15	Jul 28	12
Swift River	13	19	Jul 4	Jul 24	13	Jun 22	Jul 15	Jul 16	Aug 29	Jun 30	Aug 29	59	Jul 15	Jul 16	0
Teslin A	29	60	Jun 19	Aug 19	35	May 28	Jul 14	Jul 16	Sep 12	May 30	Sep 3	95	Jun 29	Jul 16	16
Tuchitua	9	59	Jun 22	Aug 21	9	Jun 5	Jul 2	Aug 10	Aug 29	Jun 5	Aug 25	80	Jun 29	Aug 13	44
Watson Lake A	29	93	Jun 2	Sep 4	39	May 11	Jun 25	Aug 10	Sep 17	May 11	Sep 15	126	Jun 25	Aug 10	45
Whitehorse A	29	82	Jun 8	Aug 30	46	May 13	Jul 4	Jul 30	Sep 20	May 13	Sep 17	126	Jul 4	Jul 30	25
Whitehorse Riverdale	14	61	Jun 17	Aug 18	14	Jun 5	Jul 3	Jul 19	Sep 10	Jun 8	Sep 10	93	Jun 23	Jul 19	25

TABLE 8.9

Frequency of Specified Duration for Maximum Temperature

STATION: Aishihik 06/43 09/66

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44	5	1			6																									
-35 to -39	13	1			4																									
-30 to -34	35	3			5	4				2																				
-25 to -29	51				3	16	3			7	2				1															
-20 to -24	61	3			5	36	2			7	10				3															
-15 to -19	76	2			4	49	2	1		8	25	3			4	3				2										
-10 to -14	70	2			4	60	7			5	43	3			5	6				3										
-5 to -9	56	1			4	72	3			7	64	7			5	19	1			5	1				2					
0 to -4	57	8			6	66	9			6	83	21	1		9	63	5			6	4				2					
1 to 5	25				3	35	3			7	53	17	3		10	53	23	11	4	18	27	3	1		8	1				1
6 to 10	3				2	2				1	10				3	39	4	2		14	65	20	3		10	39				3
11 to 15											1				1	9	0	1		10	64	22	6		13	85	16	2		13
16 to 20																	1			4	41	5	1		8	93	24	3		14
21 to 25																					10	1			5	35	13			7
26 to 30																					1				3	6	1			6
>30																										1				1

	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																										6				2
-35 to -39																					1				2	20	2			5
-30 to -34																					3				2	30				3
-25 to -29																					11	3			5	30	1			4
-20 to -24																					29	3			5	65	4			4
-15 to -19																1				1	49	2			4	73	5			5
-10 to -14																11	3			6	56	7	1		8	73	2			4
-5 to -9																30	3			7	62	7	1		9	53	2			5
0 to -4											9	1			4	67	4			6	62	6	1		9	60	2			6
1 to 5						3				2	33	5			4	102	19	3		11	47	6			6	23	4			5
6 to 10	7				2	35				3	88	22	2	1	16	63	5	3		10	15	1			4	2				1
11 to 15	81	11			5	89	18	5		10	99	18	3		9	9	1			4										
16 to 20	109	24	4	1	19	106	18	1		8	43	4			5	1				1										
21 to 25	62	11	3		12	46	8			7	8				3															
26 to 30	17				3	10				3																				
>30																														

TABLE 8.9 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Aishihik A 06/1943 09/1966

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	≤-40	32	4	4			12
	-30 to -39	54	13	7	2		17
	-20 to -29	30	15	11	7	2	38
	-10 to -19	7	4	5	5	8	70
FEBRUARY	≤-40	23	3				6
	-30 to -39	44	12	3	1		17
	-20 to -29	38	19	9	6		30
	-10 to -19	14	3	7	5	5	45
	0 to -9					1	81
MARCH	≤-40	8					2
	-30 to -39	33	5	3			11
	-20 to -29	71	26	7	1		23
	-10 to -19	14	14	13	10	1	31
	0 to -9	1				2	46
APRIL	-30 to -39	5					2
	-20 to -29	22	4	1			8
	-10 to -19	69	19	5	2		25
	0 to -9	2		2	5	1	34
MAY	-10 to -19	12	1				5
	0 to -9	68	18	8			14
JUNE	0 to -9	53	1				4
JULY	0 to -9	10					2
AUGUST	0 to -9	63	5	1			10
SEPTEMBER	-20 to -29	1					1
	-10 to -19	13					3
	0 to -9	102	19	9	6		21
OCTOBER	-20 to -29	18	2				7
	-10 to -19	57	21	7	3	3	113
	0 to -9	19	14	8	2	19	225
NOVEMBER	≤-40	7	1				4
	-30 to -39	29	3	3	1		23
	-20 to -29	46	12	13	7		30
	-10 to -19	31	9	10	11	8	113
	0 to -9	2		1		8	181
DECEMBER	≤-40	20	7	2			13
	-30 to -39	38	12	8	3		21
	-20 to -29	31	14	13	7	4	43
	-10 to -19	10	9	2	4	7	84
	0 to -9					1	73

TABLE 8.10

Frequency of Specified Duration for Maximum Temperature

STATION: Anvil 11/67 – 07/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44	1	1			4																									
-35 to -39	7				3	1				1																				
-30 to -34	17	3			4	3				3																				
-25 to -29	27				3	8	1			4																				
-20 to -24	35	3			5	16	1			4	5				3															
-15 to -19	36	2			5	14	2	1		8	5	1			4															
-10 to -14	37	3			4	30	5			5	15	4			4	1				1										
-5 to -9	30	4			7	36		1		8	49	6			5	7	1			4										
0 to -4	24	3			5	31	12	3		12	49	12	4		8	29	5	2		9	2				1					
1 to 5	15	1			4	20	3			5	30	5	2		11	38	14	2	2	15	24	1			4					
6 to 10	2				2	3				3	5				2	23	8	1		9	35	14	2	1	15	20				3
11 to 15																8				2	41	5	2		9	45	16			6
16 to 20																1				1	23	1			4	53	8			7
21 to 25																										25	1			5
26 to 30																										4	1			5
>30																														
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																										1				1
-35 to -39																										4	1			4
-30 to -34																					3				3	11				3
-25 to -29																					2				1	14	2			7
-20 to -24																1				1	9				2	26	2			5
-15 to -19																2				3	20	3			6	33	1			4
-10 to -14																4				3	29	7			7	37	3	2		9
-5 to -9																12				3	45	4			7	39	5			7
0 to -4											4	1			4	32	6			7	35	9			6	31	5			5
1 to 5						4				2	12	5	1		11	35	13	3		11	21	2			4	9				2
6 to 10	15				2	18	3			5	31	10	4	3	18	23	3			5	4				2	1				1
11 to 15	42	5	3		10	36	13	3		12	31	7	1		8	3	1			5	1				1					
16 to 20	47	18			7	40	5	1		8	10	1			4															
21 to 25	28	6			7	16	1	1		8	1				2															
26 to 30	3	1			4	3	1			4																				
>30																														

TABLE 8.10 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Anvil 11/1967 – 05/1982

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	≤-40	8	4				6
	-30 to -39	19	7	4	2		24
	-20 to -29	9	4	6	7	1	40
	-10 to -19	8	1	5	4	3	42
	0 to -9	1				2	101
FEBRUARY	≤-40	1	1				5
	-30 to -39	8	4	3			14
	-20 to -29	12	9	1	3		24
	-10 to -19	14	5	2	7	3	42
	0 to -9				1	1	42
MARCH	≤-40	1					1
	-30 to -39	1	1				5
	-20 to -29	13	11				7
	-10 to -19	25	12	5	3		24
	0 to -9		2	1			13
APRIL	-20 to -29	1	2				7
	-10 to -19	28	6	1			13
	0 to -9	3	2	1	5	1	34
MAY	-10 to -19	6					3
	0 to -9	30	16	9	1		18
JUNE	0 to -9	26	1				4
JULY	0 to -9	8					3
AUGUST	0 to -9	30	3	1			11
SEPTEMBER	-10 to -19	5	2				5
	0 to -9	31	15	5	1	2	73
OCTOBER	-30 to -39	1					3
	-20 to -29	6		1			9
	-10 to -19	23	5	5	1	2	59
	0 to -9	6	8	3	1	7	211
NOVEMBER	-30 to -39	9	2		1		16
	-20 to -29	17	7	5	4		24
	-10 to -19	16	13	3	3	5	83
	0 to -9	2	3			5	189
DECEMBER	≤-40	4	4				6
	-30 to -39	16	6	2			12
	-20 to -29	23	8	5	3	2	52
	-10 to -19	10	4	4	4	5	86
	0 to -9	3	1		1	3	139

TABLE 8.11

Frequency of Specified Duration for Maximum Temperature

STATION: Beaver Creek 11/68 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49	5	1			4																									
-40 to -44	10	1			6																									
-35 to -39	19	2			7	2				1																				
-30 to -34	27	1			4	6				2																				
-25 to -29	26				3	14	2			4		1			4															
-20 to -24	28	1	1		8	23	4			5	2	1			5															
-15 to -19	19	3			5	33	4			6	4	1			6															
-10 to -14	16	3			7	24	5			7	17				3	1				1										
-5 to -9	10	1			4	24	2			4	26	4	1		10	10				2										
0 to -4	1				1	15	2			4	32	5	1		8	19	1			5										
1 to 5	2				1	5				2	27	7			6	33	8	1		8	6				2					
6 to 10											11	3			6	31	12	5		13	30	4			6	7				1
11 to 15																15	1			4	41	9	3		8	27	3			6
16 to 20																2	1			5	27	7			6	40	13			7
21 to 25																					5	1			4	30	6	1		8
26 to 30																										6	3			5
>30																										1				3

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																										5				3
-40 to -44																										11	2			4
-35 to -39																										17				3
-30 to -34																					4				3	17				3
-25 to -29																	1			4	8	1			4	27	3			5
-20 to -24																1				1	17	2			5	37	3	1		8
-15 to -19																2	1			5	39	1	2		12	44	2			4
-10 to -14																4	1			5	38	5	1		10	28	3			4
-5 to -9																19	2	1		12	26	2			5	12				2
0 to -4											4				3	36	8			6	7	1			5	7				2
1 to 5						3				2	13	3	1		8	36	5			6	5				2	1				1
6 to 10	2				1	9				3	42	3			5	22	2			4	3				1	1				1
11 to 15	22	1			5	33	3			7	39	8	1		10	10				3										
16 to 20	44	7	1		8	48	7	2		11	27	2			7															
21 to 25	42	8			5	32	3			4	6				1															
26 to 30	18	2			5	9	1			6																				
>30						1				1																				

TABLE 8.11 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Beaver Creek 11/1968 – 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS) 1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	<-40	12	5	9			13
	-30 to -39	13	9	3	6		30
	-20 to -29	5	7	3	3	1	32
	-10 to -19	2	6			1	64
	0 to -9	2	6				5
FEBRUARY	<-40	13	6				6
	-30 to -39	25	6	8			13
	-20 to -29	13	7	3	7		25
	-10 to -19	2	9	1			8
	0 to -9	1	9	1			12
MARCH	<-40	6					3
	-30 to -39	22	5	1			9
	-20 to -29	25	18	3	2		16
	-10 to -19	10	16	2	3		19
	0 to -9	1	16		1		24
APRIL	-30 to -39	5					2
	-20 to -29	17	1				5
	-10 to -19	27	13	1			8
	0 to -9	3	12		2		22
MAY	-10 to -19	1					1
	0 to -9	41	16	3			12
JUNE	0 to -9	28					3
JULY	0 to -9	3					2
AUGUST	0 to -9	29	6	2			11
SEPTEMBER	-20 to -29	1					2
	-10 to -19	9	3				7
	0 to -9	33	14	3	1	7	232
OCTOBER	-30 to -39	2		1			11
	-20 to -29	19	3		1		25
	-10 to -19	37	11	4	1	4	178
	0 to -9	2	6			3	217
NOVEMBER	<-40	5	1				4
	-30 to -39	25	3	5	2		22
	-20 to -29	23	14	5	2	7	90
	-10 to -19	6	11			7	148
	0 to -9	5	11			1	143
DECEMBER	<-40	16	6	4			13
	-30 to -39	23	19	4		1	35
	-20 to -29	6	10	2	2	4	87
	-10 to -19	3	9	1			11
	0 to -9	3	9	1			11

TABLE 8.12

Frequency of Specified Duration for Maximum Temperature

STATION: Boundary 01/67 – 05/78

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																														
-35 to -39	11				2	1				1																				
-30 to -34	22	1			6	9				3	1				3															
-25 to -29	31	3			5	11				3	2				2															
-20 to -24	26	1	1		8	28	2			7	4	2			6															
-15 to -19	31	2			4	28	1			5	15	1			4	1				1										
-10 to -14	33	2			6	35	2			4	33	3			4	9				3										
-5 to -9	21	3			6	30	6			7	39	4	1		8	17	1			4										
0 to -4	3				3	27	1			4	28	10			6	36	7			6	4				2					
1 to 5						4	1			5	9	1			4	35	10	2	1	17	21	2			7	2				1
6 to 10	1				1											12	3			5	42	7			6	14				3
11 to 15																1				3	34	1	1		9	25	2			5
16 to 20																					17	4	1		9	28				3
21 to 25																										10	1			6
26 to 30																										4				3
>30																														

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																														
-35 to -39																										2				2
-30 to -34																					1				1	12	1	1		8
-25 to -29																1				2	8				3	20	1			4
-20 to -24																					12	1			4	22				3
-15 to -19																2				2	26	1			4	18	3			4
-10 to -14																7	1			4	31	2			4	29	4			6
-5 to -9											1				1	25	4			8	23	3			6	29	7			7
0 to -4						1				2	6	1			5	34	4			7	16	2			4	9	1			5
1 to 5						1				1	14	2			6	14	4			5	9	1			4					
6 to 10	8				2	7	1	1		10	28	1			4															
11 to 15	25	3			4	25	2			5	21	1	1		9															
16 to 20	34	4	1		9	24				3	2				1															
21 to 25	15	2	1		11	10	2			5	1				2															
26 to 30	2				1		1			4																				
>30																														

TABLE 8.12 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Boundary 01/1967 – 05/1978

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	≤-40	10	2				4
	-30 to -39	18	5	4	1		19
	-20 to -29	12	19	5	1	1	31
	-10 to -19	10	19	3	3		23
	0 to -9	2	23	1		1	92
FEBRUARY	≤-40	1					3
	-30 to -39	14	6	2			13
	-20 to -29	10	13	5	1		18
	-10 to -19	7	11	5	2	2	37
	0 to -9	1	14	1		1	53
MARCH	≤-40	1					1
	-30 to -39	6		1			10
	-20 to -29	15	11				7
	-10 to -19	5	13	6	3		24
	0 to -9		12	1		1	61
APRIL	-30 to -39	1					1
	-20 to -29	7	2				5
	-10 to -19	21	8	2			11
	0 to -9	7	11	3	1		18
MAY	-10 to -19	1					1
	0 to -9	20	8	1			9
JUNE	0 to -9	2					2
JULY							
AUGUST	0 to -9	4	1				4
SEPTEMBER	-10 to -19	3					2
	0 to -9	13	4		2		23
OCTOBER	-30 to -39	1					2
	-20 to -29	3	1				4
	-10 to -19	16	6	1	1	1	31
	0 to -9		15	1	3	2	215
NOVEMBER	-30 to -39	6	2	1			8
	-20 to -29	12	7	3	2		22
	-10 to -19	10	15	1	4	2	122
	0 to -9	4	15			4	191
DECEMBER	≤-40	4					1
	-30 to -39	10	6	3	1		26
	-20 to -29	26	7	2	2	1	52
	-10 to -19	15	13		2	3	56
	0 to -9	8	15			2	146

TABLE 8.13

Frequency of Specified Duration for Maximum Temperature

STATION: Braeburn 05/74 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49		1			5																									
-40 to -44	3				1																									
-35 to -39	6				1	2	1			4																				
-30 to -34	9				3	7				3																				
-25 to -29	13	1			5	6				3																				
-20 to -24	19				2	9	2			7	1				1															
-15 to -19	14	2			5	16				3	3				1															
-10 to -14	13	3			5	11				2	6				2															
-5 to -9	13				2	14	1			5	17	2			5	2				2										
0 to -4	15	1			4	16				3	26	5			5	6	1			6										
1 to 5	14	4			5	14	4			6	26	4	4		11	15	1	1		11	1				1					
6 to 10	5				2	3				2	15				3	19	5	1	1	21	16	3			5	1				1
11 to 15											1				1	9	4			6	28	12	1		13	20	1	1		10
16 to 20																4				3	20	5	2		9	33	5	2		8
21 to 25																2				1	8				3	19	2	1		9
26 to 30																					2				1	5				3
>30																										1				1

	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																										2				1
-40 to -44																										6	2			5
-35 to -39																										10	1			4
-30 to -34																										13	1			5
-25 to -29																					3				3	15	1			6
-20 to -24																					7		1		8	23				3
-15 to -19																1				3	13	1			5	16	1			4
-10 to -14																1				2	22	2	1		8	17				3
-5 to -9																1				2	20	1			5	14				2
0 to -4											2				2	12	1			5	27	2			4	16	1			5
1 to 5											10	1			4	31	4			7	18	4			7	11	2			4
6 to 10						1				1	27	4			7	24	9	1		12	3	2			5	1				1
11 to 15	6	1			4	18	4			5	27	6	3		11	8	1			5										
16 to 20	26	6	1		10	29	3	4		12	14	6			7	1				1										
21 to 25	29	4	1		8	26	4			5	3				2															
26 to 30	7	3			6	10	1			5	1				1															
>30						1				1																				

TABLE 8.13 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Braeburn 05/1974 – 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	≤-40	7	6	1	1		15
	-30 to -39	9	4	5	2		19
	-20 to -29	5	5	5	3		17
	-10 to -19	3	3	5	2	1	50
	0 to -9	1				1	90
FEBRUARY	≤-40	7	4	1			9
	-30 to -39	13	4	3			12
	-20 to -29	17	2	4	2	1	31
	-10 to -19	6	3	3	4		28
	0 to -9					2	75
MARCH	-30 to -39	7	2				6
	-20 to -29	24	8	2			8
	-10 to -19	[illegible]	7	5	3		21
	0 to -9				1		28
APRIL	-30 to -39	1					1
	-20 to -29	5					2
	-10 to -19	23	4	1			10
	0 to -9	5	8	2	3		19
MAY	0 to -9	45	8	4			13
JUNE	0 to -9	25					3
JULY	0 to -9	4					1
AUGUST	0 to -9	26	1	1			14
SEPTEMBER	-10 to -19	5					3
	0 to -9	45	12	1	1		20
OCTOBER	-30 to -39	2					3
	-20 to -29	4			1		26
	-10 to -19	33		1		1	85
	0 to -9	22	5	7	1	5	189
NOVEMBER	≤-40	2					
	-30 to -39	4	2	3	1		
	-20 to -29	22	3	3	3	2	
	-10 to -19	11	7	7	1	4	
	0 to -9	1		1	1	4	
DECEMBER	≤-40	6	6	3			13
	-30 to -39	17	6	4	2		16
	-20 to -29	15	4	5	2	2	45
	-10 to -19	1	1	3	1	4	81
	0 to -9					1	63

TABLE 8.14

Frequency of Specified Duration for Maximum Temperature

STATION: Burwash A 10/66 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44	2				1																									
-35 to -39	12	2			6	1				2																				
-30 to -34	23	1			4	4	1			4																				
-25 to -29	29	6			5	12				3	1				3															
-20 to -24	38				3	27	2			6	3	1			4															
-15 to -19	40	3			5	33	2			7	4		1		8															
-10 to -14	39	3			4	27	2			6	19	1			4															
-5 to -9	20	3			7	41	2			5	38	7			7	5				2										
0 to -4	23				3	40	5			5	53	11			6	23	3	1		8										
1 to 5	12	5	1		10	28	3			7	38	17	1		8	43	17	1		9	12				3					
6 to 10	3				1	6	1			4	19		1		8	39	10	3	2	16	50	6	2		10	3				1
11 to 15						1				1	1				1	12	2			6	62	17	6		10	55	7	1		9
16 to 20																1	1			5	33	6			7	76	12	3		8
21 to 25																					3				1	32	3	1		11
26 to 30																										4	1			4
>30																										1				3
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																										1				1
-40 to -44																										6	1			4
-35 to -39																										15	3			4
-30 to -34																										21				3
-25 to -29																					2				1	28	2			6
-20 to -24																	1			6	18	1			9	46	2			4
-15 to -19																1				1	27	2			6	43	4			4
-10 to -14																6	1			4	43	7			7	39	2			6
-5 to -9																19	1			5	50	6			6	31	2			5
0 to -4											4	1			5	41	7			6	47	5			5	40	4			5
1 to 5						1				2	14	2			6	83	11			7	34	4			5	17	1			5
6 to 10	2				1	9	1			5	51	7	1		8	69	5			6	8	2			6	1				1
11 to 15	45	5			6	52	8	1	1	18	52	15	4		13	20	1			4	1				1	1				1
16 to 20	59	29	2		10	58	22	4		11	20	1			6	2				1										
21 to 25	50	7	1		8	33	4			6	1				1															
26 to 30	8	1			5	6	1			5																				
>30																														

TABLE 8.14 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Burwash A 10/1966 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS) 1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	≤-40	17	12	4			12
	-30 to -39	24	11	11	5		24
	-20 to -29	13	8	9	5	2	44
	-10 to -19	3	6	4		3	48
	0 to -9	1				2	103
FEBRUARY	≤-40	18	7				6
	-30 to -39	22	9	4	2		23
	-20 to -29	26	11	6	5	1	32
	-10 to -19	5	2	6	8	3	39
	0 to -9			1	1	1	63
MARCH	≤-40	7					3
	-30 to -39	22	6				6
	-20 to -29	48	13	6	1		15
	-10 to -19	22	15	4	7		27
	0 to -9					1	66
APRIL	-30 to -39	2					2
	-20 to -29	19					3
	-10 to -19	59	6	3			13
	0 to -9	4	3	5	5		26
MAY	-10 to -19	2					1
	0 to -9	63	15	6	1		17
JUNE	0 to -9	67	1				4
JULY	0 to -9	13					2
AUGUST	0 to -9	53	6				7
SEPTEMBER	-20 to -29	1					1
	-10 to -19	12	2				6
	0 to -9	67	24	4	3	2	36
OCTOBER	-30 to -39	3					2
	-20 to -29	12			1		25
	-10 to -19	57	11	6	4	2	85
	0 to -9	16	9	5	4	11	211
NOVEMBER	≤-40	3					1
	-30 to -39	22	6	2	1	1	31
	-20 to -29	36	12	9	5	2	47
	-10 to -19	12	8	4	6	9	128
	0 to -9	3		1		7	192
DECEMBER	≤-40	15	6	3			13
	-30 to -39	35	11	7	1		16
	-20 to -29	17	8	11	7	3	59
	-10 to -19	3	2	1	4	5	94
	0 to -9					1	65

TABLE 8.15

Frequency of Specified Duration for Maximum Temperature

STATION: Carcross 01/07 – 11/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49	1				1																									
-40 to -44	3				2																									
-35 to -39	13	1			5	4				3																				
-30 to -34	45	3			6	10	1			4																				
-25 to -29	63	3			6	36	2			5																				
-20 to -24	99	10	1		9	58	5	1		8	10				2															
-15 to -19	74	10			6	90	5			5	20	5			6	2				2										
-10 to -14	97	7			7	105	12			7	47	3			6	5				2										
-5 to -9	90	6			5	96	9			6	90	6			7	11	1			4										
0 to -4	85	2			5	102	8	1		9	141	20	3		9	39	2			4										
1 to 5	57	9	1	1	21	75	16	2		8	135	27	12		12	95	34	6		12	22	2			4	1				1
6 to 10	12				2	21	2			4	51	7	1		8	97	37	15	4	24	98	28	2		11	24				3
11 to 15						1				1	2				1	38	5	2	1	28	143	33	10	3	18	119	25	1		9
16 to 20						1				1						5	1			6	76	14	4	1	22	152	47	8	1	26
21 to 25																1				1	17	1	1		14	97	11	2		10
26 to 30																					3				2	19	2		1	34
>30																										2				3
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
<-60																														
-55 to -59																														
-50 to -54																										1				2
-45 to -49																										1				1
-40 to -44																										3				2
-35 to -39																										9	1			4
-30 to -34																					3				2	28				3
-25 to -29																					8				3	43	3	1		9
-20 to -24																					22				3	64	4			6
-15 to -19																3				2	36	2	1		9	73	3	1		8
-10 to -14																2				2	70	9			6	100	8			5
-5 to -9																20	1			4	98	13	2		11	106	5			6
0 to -4											2				3	46	8	1		8	114	14			7	118	7	1		9
1 to 5											23	1			6	135	18	3	1	18	86	31	3		11	85	10	1		8
6 to 10	8				1	13				3	109	15	8		14	117	47	9	2	17	48	4			5	14	3	1		11
11 to 15	98	4			4	123	16	4	1	16	138	32	4	2	21	69	7		1	17	4				1					
16 to 20	154	31	17	1	24	177	46	9	3	20	93	18	4	1	31	8				1										
21 to 25	127	24	4		11	102	9	3	1	16	29	2			6															
26 to 30	38	8			7	20	5			7	3				1															
>30	7				2	2				1																				

TABLE 8.15 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Carcross 01/1907 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS) 1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	<-40	39	10	1			9
	-30 to -39	52	25	8	4		19
	-20 to -29	47	27	25	12	3	39
	-10 to -19	12	16	14	17	11	56
	0 to -9	2	6	2		10	120
FEBRUARY	<-40	13	5				5
	-30 to -39	55	18	5			14
	-20 to -29	53	26	15	6		26
	-10 to -19	32	15	22	17	1	34
	0 to -9	1	8		1	6	87
MARCH	-30 to -39	29	4				5
	-20 to -29	85	18	4	3		19
	-10 to -19	73	38	18	10	1	31
	0 to -9	6	8	1	1	5	47
APRIL	-20 to -29	20	1				4
	-10 to -19	70	12	3			12
	0 to -9	22	22	9	8	2	40
MAY	-10 to -19	3					2
	0 to -9	129	50	6	2		16
JUNE	0 to -9	78	2				6
JULY	0 to -9	17					2
AUGUST	-10 to -19	1					1
	0 to -9	60	5		1		17
SEPTEMBER	-10 to -19	8					3
	0 to -9	137	36	5			11
OCTOBER	-30 to -39	1					1
	-20 to -29	9	1				6
	-10 to -19	51	5		3		25
	0 to -9	107	28	18	17	14	203
NOVEMBER	<-40	2					1
	-30 to -39	10	5	1			11
	-20 to -29	49	12	6	4	2	35
	-10 to -19	61	33	19	9	9	56
	0 to -9	9	16	7	5	18	179
DECEMBER	<-40	18	3	2			8
	-30 to -39	41	14	6	3		20
	-20 to -29	64	26	17	10		27
	-10 to -19	45	30	18	13	9	80
	0 to -9	3	12	2	2	12	148

TABLE 8.16

Frequency of Specified Duration for Maximum Temperature

STATION: Carmacks 08/63 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
<-60																														
-55 to -59																														
-50 to -54	3				3	1				1																				
-45 to -49	15	2			4	1				1																				
-40 to -44	24	2			5																									
-35 to -39	33	1			5	6				2																				
-30 to -34	44				3	11	1			4																				
-25 to -29	53	3			5	18	1			4	1				2															
-20 to -24	52	2			5	28	2			5	6	1			4															
-15 to -19	45	3			6	45	3			5	9	1			4															
-10 to -14	35	1			5	41	2			8	14	6			6															
-5 to -9	20	1			4	40	2			7	33	6	1		8	1				1										
0 to -4	17	2			4	33	5			5	49	11			7	17	1			5	1				3					
1 to 5	10				3	31	2			7	56	7	2		10	43	11			7	5				3					
6 to 10	2				1	11	1			4	72	3	2		10	52	19	5	1	18	30	2	1		9	4				1
11 to 15						1				3	3				1	32	8	2		12	63	14	3		9	36	2			4
16 to 20																3	2			5	60	10	6		14	69	20	1	1	17
21 to 25																1	1			4	19	2	1		8	68	18			7
26 to 30																										14	5			6
>30																										2	1			4

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
<-60																														
-55 to -59																														
-50 to -54																										1				2
-45 to -49																										10	1			4
-40 to -44																										19				3
-35 to -39																					4				3	17				2
-30 to -34																					9				3	30	1			5
-25 to -29																					22				3	48				3
-20 to -24																1				1	30	1			6	53	2			4
-15 to -19																2				2	39	4			5	55	2			7
-10 to -14																10				3	60	6			5	44	3			5
-5 to -9																22	1			5	58	4	1		9	39				3
0 to -4												1			5	40	6			6	49	4			5	27	1			4
1 to 5						1				1	17				3	78	9			6	34	1			6	17	1			4
6 to 10						5				3	45	6			7	87	4	1		9	10	1			6	1				1
11 to 15	22	1			4	41	4	1		8	78	22	1	1	15	41	3	1		10	3				1					
16 to 20	65	14	2		9	71	16	4		9	63	12			6	9				3										
21 to 25	90	11	2		9	65	12	1		8	11				3															
26 to 30	36	9			7	27	3			6	1				1															
>30	6				2	3				1																				

TABLE 8.16 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Carmacks 08/1963 – 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	<-40	25	14	3	3		23
	-30 to -39	26	7	12	6		26
	-20 to -29	14	4	7	9	3	36
	-10 to -19	4	3	4	1	4	40
	0 to -9					2	70
FEBRUARY	<-40	14	6				6
	-30 to -39	34	9	3	1		15
	-20 to -29	26	13	9	3	1	45
	-10 to -19	9	1	7	8		25
	0 to -9					1	61
MARCH	<-40	6	1				5
	-30 to -39	19	9				6
	-20 to -29	40	10	6	1		22
	-10 to -19	26	14	5	7		29
	0 to -9				1	3	53
APRIL	-30 to -39	1					2
	-20 to -29	8	1				4
	-10 to -19	41	7	1			12
	0 to -9	5	9	12	6	1	35
MAY	-10 to -19	3					2
	0 to -9	66	14	3	1		22
JUNE	0 to -9	15	1				4
JULY	0 to -9	3					1
AUGUST	0 to -9	33	2				5
SEPTEMBER	-10 to -19	6					3
	0 to -9	71	23	3	3	3	226
OCTOBER	-30 to -39	1					1
	-20 to -29	10		1			12
	-10 to -19	45	8	6	1	2	140
	0 to -9	23	10	4	1	16	213
NOVEMBER	<-40	7	1				4
	-30 to -39	16	6	5	2		19
	-20 to -29	45	8	7	7	3	81
	-10 to -19	17	8	6	9	9	121
	0 to -9				1	3	158
DECEMBER	<-40	19	5	6	2		16
	-30 to -39	32	7	5	5	2	40
	-20 to -29	13	15	7	3	6	48
	-10 to -19		1	1	1	9	95

TABLE 8.17

Frequency of Specified Duration for Maximum Temperature

STATION: Dawson 07/1897 – 01/1979

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
≤-60																														
-55 to -59																														
-50 to -54	8	3			5	1				2																				
-45 to -49	58	6	2		10	6				2																				
-40 to -44	123	3			4	28	4			5																				
-35 to -39	124	6			6	57	3			4																				
-30 to -34	164	4			5	108	8			6	2				2															
-25 to -29	195	10			6	153	4			6	26	3			4															
-20 to -24	235	15			7	215	14			6	77	6	1		8															
-15 to -19	216	25			6	233	19	3		9	153	4	1		9	4				3										
-10 to -14	134	17	1		10	192	29	2		10	237	18	3		10	22	1			4										
-5 to -9	63	4			6	126	10	1		8	272	25	2		8	60	2			5	1				2					
0 to -4	17	1			4	43	1			4	239	22	2		8	138	9			7	8				2					
1 to 5	6				2	24				3	129	24	2		10	232	34	7		10	35	1			5					
6 to 10	1				1	6				2	44	11	2		10	226	74	13	1	15	143	20			7	6				2
11 to 15											2				1	125	32	8		13	220	56	6	1	18	92	6			4
16 to 20																15	4	2		9	253	70	11	1	15	275	54	9		12
21 to 25																2				2	113	15	1		8	321	75	9		14
26 to 30																					22	1			4	144	28			7
>30																										18	2			4

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
≤-60																														
-55 to -59																														
-50 to -54																										7				3
-45 to -49																										28	6	1		8
-40 to -44																					11	1			5	60	6			7
-35 to -39																					25	5			6	85	6			7
-30 to -34																					57	2			4	111	4			5
-25 to -29																					81	5			7	170	5			6
-20 to -24																4	2			5	153	15			6	268	20			6
-15 to -19																11	1			4	219	20	1		8	265	31			7
-10 to -14																70	3	1		9	213	24	3		9	193	26	2		8
-5 to -9																142	24	3		9	212	25	3		9	88	3			4
0 to -4						1				1	12	1	1		9	217	58	10		13	121	12	1		9	26				3
1 to 5						2				1	92	12	3		13	247	50	7	1	15	45	2			4	14				2
6 to 10	3				1	22	2			7	252	59	4	1	15	177	17			6	17				2	5				2
11 to 15	48				3	180	21	1		9	270	73	11		13	53	1			4	1				1	1				2
16 to 20	281	40	1		11	303	86	16	2	19	160	25	3		13	10				3										
21 to 25	384	78	11		11	259	52	7		10	40	4	1		8															
26 to 30	201	39	3		11	78	16	2		10	4				2															
>30	18	2			4	5				2																				

TABLE 8.17 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Dawson 07/1897 – 01/1979

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	≤40	80	48	24	4		18
	-30 to -39	99	49	35	24	3	37
	-20 to -29	38	15	23	22	24	62
	-10 to -19	3	2		4	10	88
	0 to -9	2	2		1	1	91
FEBRUARY	≤40	57	28	8			11
	-30 to -39	118	37	24	6		21
	-20 to -29	85	32	23	24	5	47
	-10 to -19	6		4	7	4	52
	0 to -9				1	2	63
MARCH	≤40	30	6				5
	-30 to -39	117	25	13			12
	-20 to -29	182	68	29	6		19
	-10 to -19	57	15	28	14	1	48
	0 to -9				1	2	38
APRIL	≤40	1					3
	-30 to -39	11	1				4
	-20 to -29	70	9	2			10
	-10 to -19	147	48	10	2		19
	0 to -9	52	27	26	18	1	34
MAY	-10 to -19	14	1				4
	0 to -9	266	33	14			13
JUNE	0 to -9	32					3
JULY	0 to -9	3					2
AUGUST	0 to -9	78	5	2			12
SEPTEMBER	-10 to -19	24	2	1			9
	0 to -9	240	61	20	6	7	221
OCTOBER	-30 to -39	4	1				4
	-20 to -29	40	6	2	1		15
	-10 to -19	150	34	23	8	14	163
	0 to -9	71	24	11	3	70	221
NOVEMBER	≤40	16	7	2		1	33
	-30 to -39	78	17	21	9	1	35
	-20 to -29	114	39	35	32	11	83
	-10 to -19	50	17	8	12	56	154
	0 to -9		1		2		30
DECEMBER	≤40	48	33	15	3		21
	-30 to -39	118	46	27	10	4	52
	-20 to -29	78	26	30	29	21	87
	-10 to -19	1	2	1	2	10	115
	0 to -9				1	3	151

TABLE 8.18

Frequency of Specified Duration for Maximum Temperature

STATION: Drury Creek 01/70 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49	1	1			4																									
-40 to -44	3	1			4	2				1																				
-35 to -39	9	1			4	3				2																				
-30 to -34	18				3	6				3																				
-25 to -29	22				3	10	1			4																				
-20 to -24	22	1			4	22	1			5	4				3															
-15 to -19	24				3	20	2			5	8				2															
-10 to -14	23				3	21	1			4	12				2															
-5 to -9	18				3	20	1			4	24	5			6	4				1										
0 to -4	14	1			4	31	1			5	42	3			7	8	2			4										
1 to 5	4				2	17	2			6	46	7			7	34	3			6	6				2					
6 to 10	1				1	10				2	19	5	1		10	32	10	6		10	28	3			4	5				1
11 to 15																20	3			5	46	10	1		12	28	2			6
16 to 20																6				3	38	6			7	57	12			5
21 to 25																1				3	9	1			5	45	2			5
26 to 30																										5	2			5
>30																										1				1

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																										1				1
-40 to -44																										9				2
-35 to -39																										10				3
-30 to -34																										11				3
-25 to -29																					7				3	13				2
-20 to -24																					8	1			4	17	1			5
-15 to -19																1				2	5	2			4	28	2			4
-10 to -14																2				3	20	7			6	27				3
-5 to -9																6				3	27	6			4	34	2			5
0 to -4																18	5			5	28	3			4	24	1			4
1 to 5											8	1			5	35	6			7	29	1			4	15				3
6 to 10						4				3	33	2			4	40	5			7	16				3	1				1
11 to 15	11				3	25	2			5	47	8	1		8	19				3	1				1					
16 to 20	46	5	2		10	52	9	1		11	26	3			5	2				1										
21 to 25	53	9			6	41	4			4	6				2															
26 to 30	22	2			5	16				2	1				1															
>30	2				1	1				1																				

TABLE 8.18 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Drury Creek 01/1970 – 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	≤-40	9	7	5			13
	-30 to -39	14	10	5	3		23
	-20 to -29	18	8	5	4		30
	-10 to -19	3	15	4	3	3	47
	0 to -9	1	17	2	1	3	70
FEBRUARY	≤-40	8	4				6
	-30 to -39	12	10	2			10
	-20 to -29	19	18	1	1		26
	-10 to -19	14	21	2	2	1	41
	0 to -9	1	24	1		1	65
MARCH	≤-40	3					3
	-30 to -39	6	2				5
	-20 to -29	28	11	1			14
	-10 to -19	22	23	3	2		27
	0 to -9	8	29		3	2	41
APRIL	-20 to -29	4	1				4
	-10 to -19	24	6	1			13
	0 to -9	10	25	9	2		29
MAY	0 to -9	60	15	2			9
JUNE	0 to -9	18					3
JULY	0 to -9	2					2
AUGUST	0 to -9	20	3				5
SEPTEMBER	-10 to -19	4	1				4
	0 to -9	42	11	3			13
OCTOBER	-30 to -39	1					1
	-20 to -29	3	1				6
	-10 to -19	25	6	1	1		16
	0 to -9	17	23	6	2	2	102
NOVEMBER	-30 to -39	7	2	2			10
	-20 to -29	28	8	5			12
	-10 to -19	33	21	2	1	3	47
	0 to -9	11	29	1	3	2	64
DECEMBER	≤-40	8	7	1			13
	-30 to -39	27	16		1		15
	-20 to -29	39	19	1	4	1	40
	-10 to -19	21	22	4	3	2	49
	0 to -9	13	23	2	1	4	75

TABLE 8.19

Frequency of Specified Duration for Maximum Temperature

STATION: Elsa 10/48 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49		1			4																									
-40 to -44	8				2	1				1																				
-35 to -39	19				3	3				2																				
-30 to -34	33	1			5	12	3	1		9																				
-25 to -29	41	3			6	27	1			5	1				2															
-20 to -24	48	5			7	38	3			6	11				3															
-15 to -19	47	1			4	39	3			6	16	6	1		9	1				3										
-10 to -14	37	7			7	29	3			4	41	6	1		14	4				2										
-5 to -9	38	3	1		9	41	6			6	66	3			10	24	1			5	2				1					
0 to -4	24	1			4	29	8			6	73	6	2		19	56	2	2		10	7				2					
1 to 5	10				3	6	2			7	32	9	2		10	66	15	7		14	17	2			5					
6 to 10	2				2	3				3	9	1			4	50	9	3		8	42	11	2	1	16	7				1
11 to 15																18	1			6	48	18	3		9	46	6	2		9
16 to 20																1	1			4	31	10			5	63	17	3		10
21 to 25																					7	2			5	31	11	1		12
26 to 30																					2				3	5				3
>30																														
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																										2				1
-40 to -44																					1				1	7	1			4
-35 to -39																					2				2	16				3
-30 to -34																					4				2	22	1			5
-25 to -29																1				1	20	1			5	30	1			4
-20 to -24																2				1	34	2			5	35	5	1		9
-15 to -19																9				3	46	3			5	49	4			5
-10 to -14																14	2			6	54	4		1	15	56	3			4
-5 to -9																37	3			7	64	8			7	57	4	1		9
0 to -4											8	1	1		13	67	15			6	45	8	1		8	35	1			4
1 to 5						5				1	31	4	1		9	66	9	3		10	24	1			6	13	1			5
6 to 10	3	1			7	23		1		10	62	10	2	1	19	30	1			7	6	2			5					
11 to 15	21	1			4	67	10	3	1	15	50	10			6	5				1										
16 to 20	55	15	1		9	72	9	3		12	23	2	1		15	1				1										
21 to 25	57	13	1		8	31	7	2		8	5	1			5															
26 to 30	23	3			5	9	2			6																				
>30		1			6																									

TABLE 8.19 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Elsa 01/1951 - 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	≤40	18	1	1			9
	-30 to -39	13	12	8	3		21
	-20 to -29	14	9	9	6	2	39
	-10 to -19	6	3	5	3	5	77
	0 to -9					4	122
FEBRUARY	≤40	2	3				6
	-30 to -39	10	8	4	2		18
	-20 to -29	11	4	4	7		26
	-10 to -19	4	5	3	6	2	36
	0 to -9				1	3	78
MARCH	-30 to -39	7	4	1			10
	-20 to -29	35	11	5	2		20
	-10 to -19	12	10	6	10	1	31
	0 to -9					5	73
APRIL	-20 to -29	18	1				4
	-10 to -19	44	9	5	2		16
	0 to -9	9	5	7	4	1	40
MAY	-10 to -19	3	2				4
	0 to -9	34	10	3			11
JUNE	0 to -9	4					3
JULY	0 to -9	2					1
AUGUST	0 to -9	16		1			11
SEPTEMBER	-10 to -19	7		1			10
	0 to -9	39	18	3	2	5	156
OCTOBER	-30 to -39	1					2
	-20 to -29	8	3	1			12
	-10 to -19	47	10	4	1	4	66
	0 to -9	12	3	6	3	14	205
NOVEMBER	≤40		1				4
	-30 to -39	14	3	2	2		18
	-20 to -29	18	14	10	2	2	32
	-10 to -19	24	12	5	8	9	158
	0 to -9					5	178
DECEMBER	≤40	6	4	2			12
	-30 to -39	14	7	5	4		25
	-20 to -29	24	12	10	7	3	47
	-10 to -19	6	2	3	1	11	95
	0 to -9					3	123

TABLE 8.20

Frequency of Specified Duration for Maximum Temperature

STATION: Faro 10/71 – 01/77

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49		1			5																									
-40 to -44	4	1			7																									
-35 to -39	7				3	1				1																				
-30 to -34	9	1			4	4				2																				
-25 to -29	16	1			5	8				3																				
-20 to -24	19				3	12				3		2			4															
-15 to -19	16				2	18	2			5	2	1			6															
-10 to -14	15				3	12	1			5	6				3															
-5 to -9	16				3	12				3	11	2			5	2				1										
0 to -4	10				2	10				3	19	5			6	7				2										
1 to 5	7				2	5				2	16	3			7	18	3			7	2				1					
6 to 10	1				1	3				1	5				3	19	3	2		13	16	2			6	2				1
11 to 15																5	3			6	24	4			6	12	3			6
16 to 20																1				2	17	2			5	25	5			6
21 to 25																1				2	5				3	17	1			5
26 to 30																										4	2			6
>30																														

	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																										2				2
-40 to -44																										4				2
-35 to -39																										4				2
-30 to -34																										6				3
-25 to -29																					4				3	9				2
-20 to -24																					5				3	16				3
-15 to -19																1				1	14				3	22	2			5
-10 to -14																2				3	18	1			4	21	1			4
-5 to -9																8				3	14	4			6	14				3
0 to -4											1				2	13	3			6	9	1			4	9				3
1 to 5											1	2			6	20	4	2		11	8		1		9	5				2
6 to 10						3				3	8	3			6	16	3			7	3				2	2				2
11 to 15	8				2	12			1	15	17	3	3		11	4				1										
16 to 20	18	2	1		13	14	5	2		9	17	1			5															
21 to 25	15	6	1		8	16	2			4	5				2															
26 to 30	4	1	1		10	6				2	1				2															
>30	1				2																									

TABLE 8.20 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Faro 10/1971 – 01/1977

MONTH	CONDITION (°C)	RANGES (DAYS) 1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	≤40	4	4	2			9
	-30 to -39	2	4	8			11
	-20 to -29	4	1	1	4		28
	-10 to -19	2	1		1	1	33
FEBRUARY	≤40	5					2
	-30 to -39	6	3	2			10
	-20 to -29	6	5	1	2		23
	-10 to -19	2	2	1	1	1	32
MARCH	≤40	1					1
	-30 to -39	2	1				4
	-20 to -29	9	3	1			8
	-10 to -19	13	2	3			10
APRIL	-20 to -29	2					3
	-10 to -19	7	4				6
	0 to -9	3	2	2	2		15
MAY	0 to -9	20	3				6
JUNE	-						–
JULY	–						–
AUGUST	0 to -9	5					2
SEPTEMBER	-10 to -19	3					2
	0 to -9	12	2	4			13
OCTOBER	-20 to -29	3					2
	-10 to -19	14	3	1	1		19
	0 to -9	6	4		1	4	201
NOVEMBER	-30 to -39	2	3				7
	-20 to -29	7	3	2	1		23
	-10 to -19	4	2	2		3	117
	0 to -9				1	1	80
DECEMBER	≤40	4	3				7
	-30 to -39	7	5		1		16
	-20 to -29	9	9		3	1	43
	-10 to -19		2		5	2	51
	0 to -9					2	136

TABLE 8.21

Frequency of Specified Duration for Maximum Temperature

STATION: Fort Selkirk 11/1898 – 12/1981

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
≤-60																														
-55 to -59																														
-50 to -54	7				3																									
-45 to -49	27	4			6	3				1																				
-40 to -44	41	1			5	5	1			5																				
-35 to -39	34				3	12				3																				
-30 to -34	53	3			4	12	2			5																				
-25 to -29	79	2			6	32	2			7	1				1															
-20 to -24	82	4			7	71	3			5	10	3			4															
-15 to -19	80	5			4	78	7			7	26	4			5															
-10 to -14	59	2	1		8	82	6			7	46	6			6	2				2										
-5 to -9	33	1			5	55	5			7	77	8	1		8	4				1										
0 to -4	23	1			5	48	2			5	94	14	2		8	30	4	1		9	1				2					
1 to 5	14				2	30	1			4	88	10	3		10	90	11	1		9	8	1			4					
6 to 10	7				2	12	1			4	41	7	2		9	83	32	9	3	17	47	5			6	4				1
11 to 15							1			4	4				3	49	9	2	1	16	91	26	4		14	53	2			5
16 to 20																8	3			7	97	26	2		10	112	24	3		8
21 to 25																3				3	44	5			6	115	26	3		9
26 to 30																					5	1			7	43	7			6
>30																										6	1			4

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
≤-60																														
-55 to -59																														
-50 to -54																										11				3
-45 to -49																										24	3			6
-40 to -44																					6				2	28	1			5
-35 to -39																					11	1			6	37				2
-30 to -34																					17	1			6	50				3
-25 to -29																					23				3	75	1			5
-20 to -24																2				2	55	5			6	101	3			4
-15 to -19																2				2	70	3			4	86	9			6
-10 to -14																17				3	92	10			6	61	8			6
-5 to -9																35	4			5	89	11	1		8	47	2			4
0 to -4											1	2			6	76	12	2		9	61	9			6	34				3
1 to 5						1				1	24	1			5	105	16	3		8	38	1			6	19				3
6 to 10						8				3	85	7			6	86	12			7	18	1			5	8				2
11 to 15	24	1			4	67	4			7	119	25	5		13	41	2			5	5				1	1				1
16 to 20	97	24	1		9	106	28	10		12	88	10	3		11	8				2										
21 to 25	135	26	6		14	101	20	1		11	19	1			4															
26 to 30	65	17	1		11	33	6	1		9	2				1															
>30	6				2	5				2																				

TABLE 8.21 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Fort Selkirk 11/1898 – 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	≤40	44	20	12	1		16
	-30 to -39	45	20	17	7	1	31
	-20 to -29	17	5	11	11	5	46
	-10 to -19	2	1	3	1	5	66
	0 to -9	1				3	108
FEBRUARY	≤40	30	15	2			11
	-30 to -39	57	25	10	1		28
	-20 to -29	29	12	14	11	1	31
	-10 to -19	2	2	2	4	3	40
MARCH	≤40	17	4				5
	-30 to -39	51	11	4			12
	-20 to -29	59	20	17	3		24
	-10 to -19	31	14	17	7		28
	0 to -9				1	1	31
APRIL	-30 to -39	3					3
	-20 to -29	18	3				5
	-10 to -19	77	14	2			11
	0 to -9	8	14	14	6	1	41
MAY	-10 to -19	4					3
	0 to -9	118	24	6	1		18
JUNE	0 to -9	41	1				4
JULY	0 to -9	6					2
AUGUST	0 to -9	67	3				6
SEPTEMBER	-20 to -29	1					1
	-10 to -19	11	2	1			9
	0 to -9	90	39	14	1	5	203
OCTOBER	-30 to -39	1					1
	-20 to -29	20	4	2			13
	-10 to -19	66	23	9	1	7	177
	0 to -9	22	13	7	4	23	213
NOVEMBER	≤40	13	8				7
	-30 to -39	46	7	10	3		18
	-20 to -29	76	7	21	10	3	77
	-10 to -19	17	17	6	5	17	146
	0 to -9	2	1		1	8	168
DECEMBER	≤40	31	14	11	3		26
	-30 to -39	57	20	14	6	3	43
	-20 to -29	25	14	12	10	11	79
	-10 to -19	1	2			14	111
	0 to -9					2	136

TABLE 8.22

Frequency of Specified Duration for Maximum Temperature

STATION: Haines Junction 10/44 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49	4				1																									
-40 to -44	9	1			4	1				1																				
-35 to -39	28				3	2				1																				
-30 to -34	51	2			4	6				2																				
-25 to -29	89	4			4	21				3	1				2															
-20 to -24	103	9			5	52	5			6	7	1			4															
-15 to -19	108	4			4	74	5	1		8	19	1			4	1				1										
-10 to -14	92	6			5	104	5	1		8	36	6			6	3				1										
-5 to -9	92	3			5	102	5			4	81	4			6	12				2	1				1					
0 to -4	71	1			4	111	3			4	118	17	3		8	34	6			7	2				1					
1 to 5	66	3			4	93	11	2		9	115	29	7	2	18	112	23	4	1	15	17				3					
6 to 10	18				3	32				3	72	10			7	111	36	15	3	23	84	14	2		10	17				2
11 to 15	2				1	2				3	6				1	35	8			7	133	42	15		13	104	6	2		9
16 to 20											1				1	5	3			4	107	14	2		8	192	41	11	2	17
21 to 25																2				2	24	2			7	96	17	1		9
26 to 30																					4	1			4	25	3			7
>30																										1				3
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																										2				2
-40 to -44																										14	2			4
-35 to -39																										21				3
-30 to -34																					4				3	47	1			4
-25 to -29																					11	1			4	58	1			5
-20 to -24																					33	2	2		8	110	4			5
-15 to -19																2				1	74	4			6	124	7			6
-10 to -14																9				2	115	5			6	127	4			4
-5 to -9																26	5			6	118	12			6	94	5			4
0 to -4											4				2	80	6	1		12	118	5			7	82	2			5
1 to 5						1				1	25	4	1		14	158	21			7	102	5			5	65	3			5
6 to 10	3				1	17				3	115	10	2		9	157	28	6	1	16	39	7			7	20				3
11 to 15	73	1			4	106	8	1		8	139	40	8		12	68	2			5	7				3	1				1
16 to 20	139	47	9		12	123	45	15	1	15	99	13	3		11	7				3										
21 to 25	144	27	2		9	83	19	1		9	27				3															
26 to 30	38	7			5	28	1			8	1				1															
>30	4				1	1				1																				

TABLE 8.22 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Haines Junction 10/1944 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS) 1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	≤40	47	12	6			12
	-30 to -39	51	31	20	2		24
	-20 to -29	46	20	20	15	3	46
	-10 to -19	10	7	8	7	14	65
	0 to -9				1	7	105
FEBRUARY	≤40	18	5				6
	-30 to -39	50	22	7			13
	-20 to -29	66	30	18	4		29
	-10 to -19	18	10	11	12	4	43
	0 to -9				1	4	75
MARCH	≤40	9					3
	-30 to -39	39	12				7
	-20 to -29	83	32	6	2		15
	-10 to -19	48	21	14	13		29
	0 to -9	2	2	5	1	3	69
APRIL	-30 to -39	2					1
	-20 to -29	20					3
	-10 to -19	101	13	2			12
	0 to -9	5	12	20	6	2	35
MAY	-10 to -19	4					3
	0 to -9	121	53	18	2		18
JUNE	0 to -9	158	12				7
JULY	0 to -9	66					3
AUGUST	-10 to -19	1					1
	0 to -9	147	13	3			10
SEPTEMBER	-20 to -29	1					2
	-10 to -19	17	3				4
	0 to -9	138	53	12	4	4	194
OCTOBER	-30 to -39	2					2
	-20 to -29	28	4	2			11
	-10 to -19	100	23	8	5	3	83
	0 to -9	31	18	16	14	22	216
NOVEMBER	≤40	6					3
	-30 to -39	47	12	2			9
	-20 to -29	79	28	18	8		29
	-10 to -19	45	26	13	13	16	154
	0 to -9	4	1	4	3	15	168
DECEMBER	≤40	32	15	2			9
	-30 to -39	70	24	16	4		20
	-20 to -29	43	32	20	13	5	65
	-10 to -19	7	11	7	9	13	72
	0 to -9	2	5		3	3	150

TABLE 8.23

Frequency of Specified Duration for Maximum Temperature

STATION: Johnsons Crossing 08/63 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44	5	1			5	1				1																				
-35 to -39	14	1			5	1	1			4																				
-30 to -34	23	4			7	9				3																				
-25 to -29	33	1			5	22	3			4																				
-20 to -24	39	3			4	39				3	4				1															
-15 to -19	38	1			4	47	1			4	12	1			4															
-10 to -14	42	3			4	50	4			7	19	2			7															
-5 to -9	35	2	1		9	53	1			4	33	5			7	5				1										
0 to -4	27	3			7	34	2	1		9	60	6	1		8	15	2			6										
1 to 5	16	2			7	10				3	57	21	1	1	22	56	11	2		10	8				1					
6 to 10	1				1	1				1	27	4	1		8	52	21	5	1	17	43	11			7	3				1
11 to 15											1				1	14	7			6	71	16	5		12	51	5	1		10
16 to 20																3	2			5	52	7	1		8	77	24	2		13
21 to 25																1				1	17	1			4	48	9	2		11
26 to 30																										16	2			6
>30																										1				3
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																										1	1			4
-35 to -39																										8	1			5
-30 to -34																					4				1	23	3			5
-25 to -29																					5				2	25				3
-20 to -24																					17	1			4	42	3			7
-15 to -19																1				1	26	3			6	50	2			7
-10 to -14																3				1	34	4			7	92	6			7
-5 to -9																11				3	44	5			7	54	4			4
0 to -4											1				2	30	2			6	52	9	3		12	40	3			6
1 to 5											7		1		10	60	20	4		13	45	7	1		8	18				3
6 to 10						10				3	52	11	1		9	71	16	2		8	12				3	1				1
11 to 15	43	1			4	42	9	1	2	21	62	20	5	1	18	28	1			4										
16 to 20	59	25	1		12	72	16	5		14	44	5			7	2				2										
21 to 25	57	16	1		9	49	7	1		8	7				2															
26 to 30	21	9			7	9	4			5																				
>30	3				1	1				1																				

TABLE 8.23 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Johnsons Crossing 08/1963 – 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	<-40	23	12	3			9
	-30 to -39	25	11	10	1		17
	-20 to -29	15	8	9	7	2	33
	-10 to -19	10	2	4	6	7	70
	0 to -9					3	132
FEBRUARY	<-40	8					3
	-30 to -39	24	6	2			9
	-20 to -29	31	14	6	3		24
	-10 to -19	17	4	7	7	2	32
	0 to -9	1				1	68
MARCH	<-40	2					2
	-30 to -39	24	1				4
	-20 to -29	37	8	4			13
	-10 to -19	49	18	10	1		24
	0 to -9	1		2	3	3	65
APRIL	-20 to -29	9					3
	-10 to -19	52	8	1			9
	0 to -9	10	7	5	6		26
MAY	-10 to -19	1					1
	0 to -9	78	27	6			11
JUNE	0 to -9	58	6				5
JULY	0 to -9	10					1
AUGUST	0 to -9	34	2				4
SEPTEMBER	-10 to -19	6					3
	0 to -9	88	17	3			9
OCTOBER	-30 to -39	1					1
	-20 to -29	6	1				5
	-10 to -19	25	5	1	1		15
	0 to -9	39	20	11	3	12	183
NOVEMBER	-30 to -39	15	3		1		16
	-20 to -29	20	7	7	3		22
	-10 to -19	33	6	9	6	9	98
	0 to -9	2	1	1		10	173
DECEMBER	<-40	20	2	1			8
	-30 to -39	20	13	7	1		17
	-20 to -29	24	11	7	8	2	74
	-10 to -19	10	4	4	10	4	79
	0 to -9					1	145

TABLE 8.24

Frequency of Specified Duration for Maximum Temperature

STATION: Keno Hill 04/74 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																														
-35 to -39	1				3																									
-30 to -34	2				3	1				1																				
-25 to -29	2				3	2	2			4																				
-20 to -24	8	1			7	6	1	1		4																				
-15 to -19	18				3	8		1		8	6				3	1				1										
-10 to -14	17	3			7	16	1			4	22	2	1		8	4				2										
-5 to -9	15	4	1		10	19	3			5	34	4			7	8	2			4	2				2					
0 to -4	11				3	15	3	1		9	15	4			5	13	11	1	1	17	9				2					
1 to 5						1	1			4	1				1	16	1	3		13	21	5	3		9	5				1
6 to 10											1				1	4				3	25	6	1		13	22	5	1		8
11 to 15											1				1	1	1			5	8	2	1		10	29	6	1		8
16 to 20																										15			1	23
21 to 25																										2				2
26 to 30																														
>30																														
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																														
-35 to -39																														
-30 to -34																										3				3
-25 to -29																1				2						7	1			5
-20 to -24																1				3	1				1	13	1			6
-15 to -19																3	1			4	11				3	14	1	1		8
-10 to -14																12			1	15	24	3			7	18	3	1		8
-5 to -9											2				2	22	7	1		9	19	6	1		9	20	8			6
0 to -4						1				2	6	1			4	13	3			5	15		1		13	12	1			4
1 to 5						6				3	21	6	1	1	17	2				1	5	2			6					
6 to 10	16				3	18	7	1		14	18	5	2		12															
11 to 15	23	7	2		14	27	6	2		14	5	1			7															
16 to 20	20	3	1		8	14	4			6	1				1															
21 to 25	7				3	6	1			4																				
26 to 30						1				1																				
>30																														

TABLE 8.24 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Keno Hill 04/1974 02/1982

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	<-40	1	1				4
	-30 to -39	7	1	1			9
	-20 to -29	5	3	2	2		24
	-10 to -19	3	2	5		1	56
FEBRUARY	-30 to -39	4	2	1			8
	-20 to -29		6	2			12
	-10 to -19	5	2	3	1	2	44
MARCH	-30 to -39	1					1
	-20 to -29	9	2				6
	-10 to -19	8	3	1	3		27
APRIL	-20 to -29	3					2
	-10 to -19	12	3	1			8
	0 to -9			1		1	36
MAY	-10 to -19	1					2
	0 to -9	9	4	3	1		15
JUNE	0 to -9	9	1				4
JULY	0 to -9	3					3
AUGUST	0 to -9	6		1			8
SEPTEMBER	-10 to -19	2		1			9
	0 to -9	23	6	1	1	3	225
OCTOBER	-30 to -39	1					3
	-20 to -29	1		1			9
	-10 to -19	14	4	1	1	1	52
	0 to -9					3	209
NOVEMBER	-20 to -29	9	1		2		19
	-10 to -19	6	2	2	2	2	41
	0 to -9					1	172
DECEMBER	-30 to -39	2	1	3			12
	-20 to -29	7	2	2	2	1	39
	-10 to -19	2	2		4	3	72

TABLE 8.25

Frequency of Specified Duration for Maximum Temperature

STATION: Klondike 06/66 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49	4				1																									
-40 to -44	3				1																									
-35 to -39	13				2																									
-30 to -34	24				3	5	1			4	1				2															
-25 to -29	31	1	1		8	10				2	3				3															
-20 to -24	33				3	22	1			4	8	1			7															
-15 to -19	30				3	21	3			6	13				3	5				2										
-10 to -14	25	2			4	22				3	28				3	15				3										
-5 to -9	18	2			5	32	1			4	40	4			5	28				3										
0 to -4	11	1			4	29	2			7	40	7	1		8	44	3			6	6				2					
1 to 5	6				3	9	1			4	14	3			5	49	14	2		11	29				3	1				1
6 to 10	1				2	3				3						27	2			5	62	11			5	18				3
11 to 15																3	1			4	55	6			6	61	6			7
16 to 20																					16	1			4	67	12	1		9
21 to 25																						1			4	29	1			5
26 to 30																										6				2
>30																														
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																										1				2
-35 to -39																										4				1
-30 to -34																					1				1	8				2
-25 to -29																					6				2	23				3
-20 to -24																1				2	15				3	36				2
-15 to -19																3				2	29	1			4	34	1			4
-10 to -14																9	2			5	39	1			4	40				3
-5 to -9																39	4			6	39	2			6	34	1			5
0 to -4											8	3			6	62	4			6	35	3			4	27				3
1 to 5						5				3	31	3			4	53	6			6	13	1			4	4				3
6 to 10	5				1	26				3	68	10	1		12	21	2			4	3	1			4					
11 to 15	36	1			5	55	14			7	46	6			5	16	2			3										
16 to 20	71	11	1		10	57	5			4	11	1			4															
21 to 25	43	3	1		8	20	2			5	2				1															
26 to 30	10				2	1	1			4	1				1															
>30																														

TABLE 8.25

Frequency of Specified Duration for Minimum Temperature

STATION: Klondike 06/1966 – 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS) 1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	<40	22	6	1			8
	-30 to -39	16	11	10	2		18
	-20 to -29	19	4	9	3		20
	-10 to -19	10	6	6	4	1	38
	0 to -9	3	10	5	2	2	58
FEBRUARY	<40	6	1				4
	-30 to -39	20	7	3			10
	-20 to -29	22	11	4	2	1	36
	-10 to -19	4	11	6	4	1	40
	0 to -9		8	4	3	3	69
MARCH	-30 to -39	10	5				7
	-20 to -29	37	8	8			13
	-10 to -19	9	12	12	2		30
	0 to -9	1	14	4	1	2	65
APRIL	-30 to -39	3					1
	-20 to -29	26	4				6
	-10 to -19	51	23	4			11
	0 to -9	15	38	3	2		29
MAY	-10 to -19	16					3
	0 to -9	70	27		1		17
JUNE	0 to -9	45	2				5
JULY	0 to -9	13					2
AUGUST	0 to -9	51	9		1		18
SEPTEMBER	-20 to -29	2					3
	-10 to -19	11	3				7
	0 to -9	45	35	4		2	63
OCTOBER	-30 to -39	1					3
	-20 to -29	24	3				7
	-10 to -19	57	19	6	1		18
	0 to -9	12	45	2	4		27
NOVEMBER	<40	1					1
	-30 to -39	17	3	1			8
	-20 to -29	42	14	6	1		27
	-10 to -19	26	29	2	2	5	110
	0 to -9	8	28	3	3	5	110
DECEMBER	<40	9	1	1			8
	-30 to -39	30	14	1	1		15
	-20 to -29	33	22	4	3	4	47
	-10 to -19	15	22	7	1	3	81
	0 to -9	9	22	4	2	4	93

TABLE 8.26

Frequency of Specified Duration for Maximum Temperature

STATION: Kluane Lake 05/46 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																														
-35 to -39	6				2																									
-30 to -34	11	1			5	1	1			5																				
-25 to -29	15	3			7	5	1			4	1				3															
-20 to -24	17				3	8	2			5	5				2															
-15 to -19	21				3	13	2			6	6				2															
-10 to -14	18	2			5	10	1			6	7	2			4															
-5 to -9	26				3	16				3	23	2	1		8	5				2										
0 to -4	26	1			5	3	1			7	29	6			5	12	1			5										
1 to 5	19	1			4	23	3			6	20	9			7	20	9	2		8	6				1					
6 to 10	4				2	4				1	4	1			4	25	1	4		14	38	5			7	9				2
11 to 15																7	2			5	43	14	3		13	48	5	2		11
16 to 20																	1			5	15	4			7	61	11	2		8
21 to 25																					1				1	23	2			7
26 to 30																										3				2
>30																														
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																										4				2
-35 to -39																										8	1			4
-30 to -34																										11				3
-25 to -29																										15	2			5
-20 to -24																					3				2	19	1			4
-15 to -19																					7	1	1		10	21	3			4
-10 to -14																3				3	17	3			5	28	2			7
-5 to -9																4				2	32	2			5	28	3			5
0 to -4											3				2	17	1			6	32	4	1		8	24	2			4
1 to 5											7	1	1		11	29	7	3		10	23	3			4	12	1			4
6 to 10	4				1	11				3	25	6			7	28	4			7	6	1	1		8					
11 to 15	38	1			4	53	5			6	39	7	2		11	11				3	1				1					
16 to 20	46	19	1		8	55	8	2		9	22	2			6															
21 to 25	35	5	1		10	24	3	2		9	3				1															
26 to 30	7	1			4	5				2																				
>30																														

TABLE 8.26 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Kluane Lake 05/1946 08/1983

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	<-40	13	2	1			8
	-30 to -39	13	5	5	2		22
	-20 to -29	14	4	5	4		24
	-10 to -19	3	4	2	2	2	56
	0 to -9		1			2	111
FEBRUARY	<-40	3	1				5
	-30 to -39	9	2	2	1		15
	-20 to -29	10	4	2	2	1	32
	-10 to -19	7	1	7	5	1	36
	0 to -9				1	1	51
MARCH	<-40	1					1
	-30 to -39	3	3				4
	-20 to -29	25	2	1			12
	-10 to -19	19	7	7			14
	0 to -9			2	2		19
APRIL	-20 to -29	5					2
	-10 to -19	19	2	1			13
	0 to -9	3	3	6	1		17
MAY	0 to -9	49	8	6			14
JUNE	0 to -9	30					3
JULY	<-40						0
AUGUST	0 to -9	12					3
SEPTEMBER	-10 to -19	2					2
	0 to -9	43	9	2	2	1	163
OCTOBER	-20 to -29	1					1
	-10 to -19	15		1		1	86
	0 to -9	7	2	3	1	5	195
NOVEMBER	-30 to -39	1	2				5
	-20 to -29	11	4	3	2		30
	-10 to -19	13	9	6	2	1	46
	0 to -9	3		2		3	189
DECEMBER	<-40	10	5				5
	-30 to -39	17	4	3	2		18
	-20 to -29	13	5	6	6	1	37
	-10 to -19	3	1	4	6	5	89
	0 to -9					4	90

TABLE 8.27

Frequency of Specified Duration for Maximum Temperature

STATION: Komakuk Beach A 07/58 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49	1				1																									
-40 to -44	3				1	3				2																				
-35 to -39	8				3	16	3			6	8				3															
-30 to -34	40	2	1		9	44	5	1		9	40	2			4															
-25 to -29	56	4			4	64	7	1		8	64	15	2		9	15	1			4										
-20 to -24	62	7	1		9	53	9			6	76	15	2		8	28	13			7										
-15 to -19	45	7			5	40	4			6	57	5	1		9	57	21	1		9	5				2					
-10 to -14	40	1			4	30				3	30	4			4	76	6	2		8	18	3			6					
-5 to -9	35	2			4	21				3	17				3	52	5	3		14	50	10	1		8					
0 to -4	20				2	16	1			5	12				2	25	3		1	16	64	21	5	2	16	9	3			6
1 to 5	14				3	4				2	2				2	14	2			6	52	12	3		13	66	22	5		14
6 to 10	3				1	1				1						3				1	23	1			5	101	7	2		9
11 to 15																1				1	7				2	62	2			4
16 to 20						1				1											1				1	19				2
21 to 25																										12				1
26 to 30																										1				1
>30																														
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																										1				1
-35 to -39																										7				3
-30 to -34																					6	1			4	28	2			6
-25 to -29																					21	5			5	68	9			7
-20 to -24																3	1			4	50	7	2		11	94	6			6
-15 to -19																15	6	1		8	71	11			7	68	6			5
-10 to -14																42	11	1		8	74	8	3		13	46	4			6
-5 to -9											4	3			6	66	19	4		13	46	3			4	27				3
0 to -4						6		1		8	37	13	4		11	56	13	4		13	30				2	21				3
1 to 5	48	4	1		9	62	12	2		11	73	19	8		13	36	1			4	15	1			4	8				3
6 to 10	119	11			7	106	10			6	76	9	1		8	13				2	5				2	2				2
11 to 15	127	9			7	99	6	1		8	41	1			6	3				2										
16 to 20	81	4			5	59	2			5	8				1															
21 to 25	42				3	19				2	2				1															
26 to 30	8				1	3				1																				
>30																														

TABLE 8.27 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Komakuk Beach A 07/1958 - 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS) 1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	<-40	25	4				5
	-30 to -39	25	17	14	5	1	39
	-20 to -29	7	4	5	6	11	109
	-10 to -19	2		2	1	6	129
	0 to -9					2	134
FEBRUARY	<-40	29	4	2			8
	-30 to -39	22	13	17	6		29
	-20 to -29	7	1	2	7	8	64
	-10 to -19	1			1	7	95
	0 to -9	1			1	3	131
MARCH	<-40	19	2				5
	-30 to -39	39	13	16	4		23
	-20 to -29	4	4	3	11	3	35
	-10 to -19					1	32
APRIL	-30 to -39	26	11	1			12
	-20 to -29	33	10	9	4		24
	-10 to -19	5	3	3	3	2	38
	0 to -9				2	2	51
MAY	-20 to -29	16	1				4
	-10 to -19	36	9	6			14
	0 to -9	4	3	3	3	1	36
JUNE	0 to -9	60	17	1			9
JULY	0 to -9	34	2				4
AUGUST	0 to -9	61	8	6		1	124
SEPTEMBER	-20 to -29	17	3			1	37
	0 to -9	44	11	5	4	23	263
OCTOBER	-30 to -39	2					1
	-20 to -29	38	5	3	1	2	46
	-10 to -19	41	12	7	4	18	214
	0 to -9	1				3	219
NOVEMBER	-30 to -39	26	10	3	1		19
	-20 to -29	35	23	9	10	3	79
	-10 to -19	8	2			9	184
	0 to -9	2	2				7
DECEMBER	<-40	8	2				7
	-30 to -39	41	17	15	5	1	36
	-20 to -29	17	8	8	12	7	88
	-10 to -19	2	1		1	3	155
	0 to -9	1				1	194

TABLE 8.28

Frequency of Specified Duration for Maximum Temperature

STATION: Mayo A 10/24 - 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
<-60																														
-55 to -59																														
-50 to -54	10				2																									
-45 to -49	34	5	1		10	1				2																				
-40 to -44	62	3			6	7	1			5																				
-35 to -39	84	4			7	22	1			6																				
-30 to -34	99	6			5	47	3			7																				
-25 to -29	124	6			5	61	7			5	6				2															
-20 to -24	128	6			6	121	3	1		9	15	3			3															
-15 to -19	133	7			7	141	9	1		5	44	6	1		8	2				2										
-10 to -14	122	9			7	146	3			6	110	14			7	10				3										
-5 to -9	110	5			5	147	6			6	158	25			7	31				3										
0 to -4	79	2			4	123	10	2		10	189	22	3		12	65	10	1		11	4				2					
1 to 5	33	1			4	69	2			5	153	32	4	1	18	163	28	4		10	18				3	1				1
6 to 10	10	2			4	15				3	69	11	1		8	157	47	18	3	22	112	6			6	5				2
11 to 15						4				2	7				2	92	11	4	2	19	205	51	10		12	91	5	1		9
16 to 20																11	6	1		8	175	51	9		14	194	48	10		12
21 to 25																1				3	64	10			7	195	51	13	1	16
26 to 30																					10				3	77	12	1		10
>30																					2				3	4	2			5

	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
<-60																														
-55 to -59																														
-50 to -54																										11	1			5
-45 to -49																					2				3	35	4			6
-40 to -44																					7				3	54	4			5
-35 to -39																					23	1			5	57	1			5
-30 to -34																					37	2			4	66	4			7
-25 to -29																					54	1			5	93	2			6
-20 to -24																2				3	81	3			6	121	5			4
-15 to -19																6	1			4	127	9	1		8	150	12			7
-10 to -14																29				3	180	11			6	156	10	1		8
-5 to -9																64	12			6	173	18	1		8	132	7			7
0 to -4											5				1	152	25	3		8	153	8			7	91	4			7
1 to 5											58	5	1		8	218	36	5	1	16	90	9			7	39				3
6 to 10	2				1	18				3	173	37	3		11	172	20			7	33				3	15	1			4
11 to 15	53	1			4	149	13	4		9	251	45	3	1	16	58	5			5	2				1	2				2
16 to 20	203	33	1	1	17	196	72	14		13	142	22	3		9	7				3										
21 to 25	272	60	7		11	165	28	2	1	16	33	4			6															
26 to 30	124	24	3		12	51	16	1		9	3				2															
>30	14	1			4	1				1																				

TABLE 8.28 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Mayo A 10/1924 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	<-40	82	35	17	3		24
	-30 to -39	77	36	29	13	1	32
	-20 to -29	59	36	22	24	7	48
	-10 to -19	16	10	6	13	16	83
	0 to -9	2	1			6	110
FEBRUARY	<-40	54	19	5	2		16
	-30 to -39	96	26	14	5		26
	-20 to -29	115	34	24	9	2	37
	-10 to -19	23	6	16	19	4	51
	0 to -9	1			3	4	74
MARCH	<-40	24	1	1			8
	-30 to -39	90	21	1			10
	-20 to -29	161	46	15	2		22
	-10 to -19	91	42	27	16		26
	0 to -9	1	1	1	5	6	48
APRIL	<-40	1					2
	-30 to -39	9					2
	-20 to -29	47	4				7
	-10 to -19	120	25	10			13
	0 to -9	59	39	24	6		22
MAY	-20 to -29	1					1
	-10 to -19	6	1				5
	0 to -9	233	28	7			13
JUNE	0 to -9	40					2
JULY	0 to -9	10					3
AUGUST	0 to -9	113	8	1			12
SEPTEMBER	-10 to -19	19	4				5
	0 to -9	237	62	15	2		29
OCTOBER	-30 to -39	3	2				5
	-20 to -29	41	6	1			13
	-10 to -19	122	31	12	6	4	120
	0 to -9	81	38	20	8	47	212
NOVEMBER	<-40	25	9	3			9
	-30 to -39	66	16	14	6		22
	-20 to -29	124	31	24	14	5	74
	-10 to -19	62	27	22	21	29	130
	0 to -9	1	1		3	13	176
DECEMBER	<-40	45	21	17	3		26
	-30 to -39	100	33	19	12	4	47
	-20 to -29	91	36	25	20	10	50
	-10 to -19	12	7	3	8	23	94
	0 to -9					4	132

TABLE 8.29

Frequency of Specified Duration for Maximum Temperature

STATION: Old Crow 09/51 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
<-60	2				2																									
-55 to -59	12	1			4	2				1																				
-50 to -54	20	1			5	16				3	1				1															
-45 to -49	25	1			4	23	2			5	2				1															
-40 to -44	37				3	33				3	5	1			4															
-35 to -39	37	3			4	47	3			5	19	5			5	1				1										
-30 to -34	40	2			4	34	8			7	36	5			5	8				2										
-25 to -29	17	1			4	18	3	1		11	44	1			4	14	3			7										
-20 to -24	7				2	10	2			4	40	3	1		9	35	6			5	2				1					
-15 to -19	4	1			4	7				2	25	2			4	43	10	1		8	10				2					
-10 to -14	4				2	5				2	13	1			4	43	6			7	36				3					
-5 to -9	1				2						2				1	27	6			7	62	2			4	6				2
0 to -4											1				1	14	5			6	61	2			5	23	2			4
1 to 5																2				2	52	7			5	53	3			4
6 to 10																					30	2			6	67	12			6
11 to 15																					6				2	51	9	1		8
16 to 20																										12	2			5
21 to 25																										1				1
26 to 30																														
>30																														
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
<-60																														
-55 to -59																														
-50 to -54																										1				1
-45 to -49																										6	1			4
-40 to -44																					3				3	17				3
-35 to -39																					12	1			4	23				3
-30 to -34																					22				3	25	3			4
-25 to -29																1				1	35	2			4	37	5			5
-20 to -24																3				3	52	8			7	44	5	1		8
-15 to -19																9	2	1		8	58	3			5	38	4	2		10
-10 to -14																28	5	2		13	40	6	1		9	19				3
-5 to -9											2				3	52	7	1		8	29	4			6	11	2			6
0 to -4											14	5	3		10	37	8	2		12	12	1			4	6				1
1 to 5	2				1	4				3	34	12			6	24	4			5	3				2	1				1
6 to 10	9				2	22	3	2		10	57	5			5	14				3										
11 to 15	33	1			4	51	4			6	36	4			5	5				2										
16 to 20	69	10			6	56	12	1		8	7	2			6															
21 to 25	65	13	1		12	26	3	1		8	2				1															
26 to 30	24	11			7	9	2			5																				
>30						1				1																				

TABLE 8.29 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Old Crow 09/1951 - 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS) 1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	<-40	19	15	4	5		19
	-30 to -39	10	8	7	8	2	34
	-20 to -29	12	4	3	3	3	54
	-10 to -19	5	2	5	4	2	47
	0 to -9	5	2	4	4	2	76
FEBRUARY	<-40	31	9	4			12
	-30 to -39	21	6	8	7		30
	-20 to -29	5	3	5	4	4	42
	-10 to -19	2	3	2	3	5	72
	0 to -9	2	3	2	3	3	81
MARCH	<-40	13	3				7
	-30 to -39	31	13	4			10
	-20 to -29	12	8	3	5		30
	-10 to -19	1	4	1	2	3	46
	0 to -9	1	4		1	3	61
APRIL	-30 to -39	15	1				4
	-20 to -29	40	10	5			13
	-10 to -19	16	7	8	2	1	36
	0 to -9	1	2	2	4	3	42
MAY	-20 to -29	1					1
	-10 to -19	18	8	1			10
	0 to -9	32	14	2	1		19
JUNE	0 to -9	14	3	1			9
JULY	0 to -9	4					1
AUGUST	0 to -9	25	2	3			14
SEPTEMBER	-20 to -29	1					2
	-10 to -19	10	6				7
	0 to -9	36	11	6	2	10	245
OCTOBER	-30 to -39	2	1	1			10
	-20 to -29	25	11	2	1		21
	-10 to -19	29	13	5	4	9	198
	0 to -9	3	4	1	1	5	92
NOVEMBER	<-40	14	5	1			8
	-30 to -39	35	16	6	3		28
	-20 to -29	23	17	8	6	9	126
	-10 to -19		3	5	5	5	151
	0 to -9		3	3	5	1	106
DECEMBER	<-40	21	16	5	1		27
	-30 to -39	38	11	9	6	1	34
	-20 to -29	10	10	4	5	3	87
	-10 to -19	3	10	1	5	2	62
	0 to -9	3	10	1	3	2	145

TABLE 8.30

Frequency of Specified Duration for Maximum Temperature

STATION: Quiet Lake 11/66 – 10/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LOWEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44	2				1	1				1																				
-35 to -39	2				2	2				1																				
-30 to -34	6				3																									
-25 to -29	4				2																									
-20 to -24	8				3	1				2																				
-15 to -19	6				1	4				2																				
-10 to -14	7				2	5				3	4	1			5															
-5 to -9	7				2	7				3	8	2			4															
0 to -4	3				2	6	1			4	10	1			4	2				3										
1 to 5	1				2	4	1			4	8		2		8	12	2			9	8				3					
6 to 10						2				3	2				1	15	2	1		8	36	4			7	10				2
11 to 15																2				3	57	11	1		9	43	1			4
16 to 20																2	1			4	36	3	1		8	68	15			7
21 to 25																					6				2	74	1			5
26 to 30																										5		1		8
>30																										2				1
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																														
-35 to -39																														
-30 to -34																										1				2
-25 to -29																										1				3
-20 to -24																					2				2	2	1			7
-15 to -19																					3				2	4				1
-10 to -14																					6				3	6				3
-5 to -9																					6				3	12	1			4
0 to -4																5				2	5		1		9	7				2
1 to 5						1				1	8				2	15	3	1		13	5	1			4	1				1
6 to 10	1				1	9				3	35	7			6	10	3			7	2				1					
11 to 15	32				3	42	3			7	40	5	2		9	3				1										
16 to 20	67	9	3		11	70	11			5	15	3			5															
21 to 25	53	8			7	45	3			5	1				2															
26 to 30	10	3			5	14				2																				
>30																														

TABLE 8.30 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Quiet Lake 11/1966 – 09/1983

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	<40	2		1			9
	-30 to -39	3	2		1		18
	-20 to -29	2	1	1	2		35
	-10 to -19				1		15
FEBRUARY	<40		1				4
	-30 to -39	2					2
	-20 to -29	7	1				6
	-10 to -19	1		1		1	52
MARCH	-30 to -39	3	2				5
	-20 to -29	4	1	2			10
	-10 to -19		1	3			14
	0 to -9					2	71
APRIL	-20 to -29	1					1
	-10 to -19	9	4				5
	0 to -9		4	2			14
MAY	-10 to -19	1					1
	0 to -9	50	18	5			12
JUNE	0 to -9	16					2
JULY	0 to -9	2					2
AUGUST	0 to -9	10		1			8
SEPTEMBER	-10 to -19	1	1				4
	0 to -9	40	12	1			10
OCTOBER	-10 to -19	4					2
	0 to -9	10	6	2		1	134
NOVEMBER	-30 to -39	1					1
	-20 to -29		2	1	1		16
	-10 to -19	4	2		1	1	88
	0 to -9		2			1	169
DECEMBER	<40	2					2
	-30 to -39	2	1				6
	-20 to -29	2		1			10
	-10 to -19					1	38

TABLE 8.31

Frequency of Specified Duration for Maximum Temperature

STATION: Ross River 12/61 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
≤-60																														
-55 to -59																														
-50 to -54	1	1			4																									
-45 to -49	10	2			6																									
-40 to -44	16	1			5																									
-35 to -39	17	1			4	1	1			5																				
-30 to -34	29	1			4	9				2																				
-25 to -29	38	2			4	12	1			6	2				2															
-20 to -24	36	2			5	17	1	2		13	4				2															
-15 to -19	41	1			5	33	1			5	11	2			6						1				1					
-10 to -14	28				3	32	2			4	12	2			5															
-5 to -9	18	1			4	42	1			6	30	5			7	4				2										
0 to -4	6				2	36	1			7	46	4			5	11	2			5										
1 to 5	7				1	21	3			5	51	12			7	42	7	2		10	4				2					
6 to 10	1				1	12				2	23	4			6	41	12	4	2	23	32	6			7	3				1
11 to 15						2				2	2				1	19	4			5	61	14			7	22				3
16 to 20																6				3	42	9	2		9	58	15	2		11
21 to 25																1				1	13	1			6	56	6			7
26 to 30																					2				3	16	2			5
>30																										3	1			4
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
≤-60																														
-55 to -59																														
-50 to -54																										1				1
-45 to -49																										8	1			4
-40 to -44																										13	2			5
-35 to -39																					1	1			5	15				2
-30 to -34																					8				2	26	1			5
-25 to -29																					15				2	33				3
-20 to -24																					20				3	54	2			4
-15 to -19																2				1	26	3			6	67	3			5
-10 to -14																2				3	40	2			4	42	1			4
-5 to -9																12	1			4	51	2			7	30				3
0 to -4											2				1	42	4			5	38	1			4	15	1			5
1 to 5						1				1	8		1		10	60	12	1		8	18				2	7				2
6 to 10						7				3	40	3			6	53	3			6	6				2	1				1
11 to 15	16	1			4	34	1		1	19	52	6	3		12	20	2			5	2				1					
16 to 20	48	13			6	68	13	1		10	34	4			5	3				2										
21 to 25	57	13	2		9	52	8			4	9	1			4															
26 to 30	24	5			5	21	1			5	1				1															
>30	8				1	2				1																				

TABLE 8.31 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Ross River A 12/1961 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	≤-40	14	18	5	2		23
	-30 to -39	25	16	6	3		30
	-20 to -29	14	18	7	2	4	71
	-10 to -19	3	23	1		2	64
	0 to -9	3	23	1		1	34
FEBRUARY	≤-40	14	5	2			10
	-30 to -39	27	13	1	2		26
	-20 to -29	30	18	7	1		20
	-10 to -19	7	21		3		27
	0 to -9	1	24				5
MARCH	≤-40	9	2				4
	-30 to -39	36	8				7
	-20 to -29	49	18	3	1		16
	-10 to -19	14	27	5			14
	0 to -9		23	3	1	1	31
APRIL	-30 to -39	3					2
	-20 to -29	18	2				6
	-10 to -19	51	14	3			13
	0 to -9	5	32	3	2	1	38
MAY	-10 to -19	6					1
	0 to -9	57	29	7			11
JUNE	0 to -9	49	4				7
JULY	0 to -9	21					3
AUGUST	0 to -9	57	8				6
SEPTEMBER	-10 to -19	14	2				4
	0 to -9	39	26	5	2	3	235
OCTOBER	-30 to -39	1					2
	-20 to -29	13	2				6
	-10 to -19	47	16	3	1	4	158
	0 to -9	7	32		1	5	194
NOVEMBER	≤-40	10	3				7
	-30 to -39	27	5	4	1		16
	-20 to -29	44	15	7	3	3	74
	-10 to -19	21	19	1	3	4	146
	0 to -9	12	22			2	173
DECEMBER	≤-40	27	9	4			9
	-30 to -39	48	10	6	4	2	52
	-20 to -29	19	23	4	7	3	48
	-10 to -19	10	20	1	1	7	111
	0 to -9	10	20		1	4	151

TABLE 8.32

Frequency of Specified Duration for Maximum Temperature

STATION: Sheldon Lake 07/70 – 09/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																														
-35 to -39																														
-30 to -34																														
-25 to -29																														
-20 to -24																														
-15 to -19																														
-10 to -14																														
-5 to -9																2				3										
0 to -4																5				3	2				1					
1 to 5																8				3	7				3					
6 to 10																5	2			5	19	2	2		10	7				2
11 to 15																					20	7	1		8	37	2			4
16 to 20																					13	2			5	49	7	1		8
21 to 25																					1				2	18	2	1		8
26 to 30																										5				3
>30																														

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																														
-35 to -39																														
-30 to -34																														
-25 to -29																														
-20 to -24																														
-15 to -19																														
-10 to -14																														
-5 to -9																														
0 to -4											4	1			4															
1 to 5											10	2			7	1	2			4										
6 to 10	1				1	11				3	43	2			6	5				3										
11 to 15	14	1			4	28	3	2		9	44	8			7	2				1										
16 to 20	47	7			7	40	9			7	18	3			6															
21 to 25	45	4	1		8	25	4			7	1				2															
26 to 30	14	1			4	8	2			4																				
>30	1				3																									

TABLE 8.32 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Sheldon Lake 07/1970 – 10/1983

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY			MISSING DATA				
FEBRUARY	<40			1			9
	-30 to -39		1	1			14
	-20 to -29	3		1	1		15
	-10 to -19		1		1		27
	0 to -9		1		1		27
MARCH	-30 to -39	1	2				7
	-20 to -29	2	1	1			12
	-10 to -19			2			14
	0 to -9			2			14
APRIL	-30 to -39	2					1
	-20 to -29	7		1			10
	-10 to -19	10	2	1			13
	0 to -9	3	7	2			13
MAY	-10 to -19	4	1				5
	0 to -9	26	19	2	1		18
JUNE	0 to -9	53	6				6
JULY	0 to -9	25					3
AUGUST	-10 to -19	1					1
	0 to -9	41	10	1			8
SEPTEMBER	-20 to -29	2					2
	-10 to -19	11	2				7
	0 to -9	44	22	2	1		15
OCTOBER	-30 to -39	1					2
	-20 to -29	3					3
	-10 to -19	11	1				4
	0 to -9	4	8	1			12
NOVEMBER	<40	2					1
	-30 to -39	3					2
	-20 to -29	6	1				4
	-10 to -19	3	3				5
	0 to -9	1	4				5
DECEMBER			MISSING DATA				

TABLE 8.33

Frequency of Specified Duration for Maximum Temperature

STATION: Shingle Point 06/57 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49						1				1																				
-40 to -44	4				2	2	1			4																				
-35 to -39	11				2	20				3	6				1															
-30 to -34	47	3			6	47	3			7	23	1	1		10															
-25 to -29	48	5			6	61	7			5	69	10			7	16	1			4										
-20 to -24	67	6			7	55	5	1		8	90	12	1		9	36	7			7										
-15 to -19	58	6			5	42	6			6	61	4			7	60	10			6	5				2					
-10 to -14	35	2			5	23	2			4	39	2			6	74	11	2		9	16				3					
-5 to -9	26	2			5	25				3	31	1			4	52	8	2		9	39	6	2		12					
0 to -4	18	1			5	11				3	11	2			5	47	1	1		8	84	17	3		10	14	2			4
1 to 5	4				2	3				2	1				2	28	2			4	82	10	1		10	69	17	3		14
6 to 10																7	1			4	45				3	115	6			6
11 to 15																					17				3	94	2			4
16 to 20																					3				2	73	4			6
21 to 25																										36				3
26 to 30																										6				1
>30																														
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																										1				2
-35 to -39																					1				1	4	1			4
-30 to -34																					6				3	32	1	1		11
-25 to -29																					25	1	1		10	60	10			7
-20 to -24																4	1			4	49	7	1		8	81	12			6
-15 to -19																22	3	1		8	77	13	1		13	67	4			5
-10 to -14																48	7			7	73	8	2		9	45	6			6
-5 to -9											6		1		14	62	25	2		13	41	6			7	25	2			5
0 to -4	1				1	3	1			5	33	11	3		13	53	21	2		10	21	1			4	16	1			6
1 to 5	11				3	39	2	3		12	86	19	3		10	29	4	1		8	11	1			4	3				1
6 to 10	69	6			6	76	15			7	103	7			6	7				3	1				1					
11 to 15	123	5			7	115	7			5	57	4			7	2				2										
16 to 20	125	5			6	101	5	1		10	15				3															
21 to 25	91	3			6	53				3	1				1															
26 to 30	34				3	9	1			4																				
>30																														

TABLE 8.33 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Shingle Point A 06/1957 – 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	≤-40	32	7				7
	-30 to -39	30	17	9	9	1	39
	-20 to -29	10	7	1	7	10	105
	-10 to -19	2	1			5	123
	0 to -9					1	95
FEBRUARY	≤-40	31	9				7
	-30 to -39	24	7	13	6		25
	-20 to -29	4	4	2	8	6	76
	-10 to -19	3	1		1	6	81
	0 to -9	2	1			2	84
MARCH	≤-40	15	2				6
	-30 to -39	46	28	9	3		22
	-20 to -29	6	8	5	13	1	32
	-10 to -19		1	1	1	5	52
	0 to -9		1	1		1	63
APRIL	-30 to -39	37	6	1			13
	-20 to -29	34	18	8	3		19
	-10 to -19	5	3	6	8	1	38
	0 to -9		1		3	4	54
MAY	-30 to -39	1					1
	-20 to -29	18	3				6
	-10 to -19	35	9	5	1		15
	0 to -9	7	5	3	5		30
JUNE	-10 to -19	1					1
	0 to -9	65	17	2			14
JULY	0 to -9	12					2
AUGUST	0 to -9	34	4	2			12
SEPTEMBER	-10 to -19	9	4				7
	0 to -9	55	15	10	2	19	258
OCTOBER	-30 to -39	5					2
	-20 to -29	36	10		3		27
	-10 to -19	47	9	6	10	13	186
	0 to -9				1	7	250
NOVEMBER	≤-40	6					2
	-30 to -39	34	10	3			14
	-20 to -29	24	21	13	11	4	102
	-10 to -19	10	4	3	2	12	184
	0 to -9	3	1	2		2	202
DECEMBER	≤-40	17	4				5
	-30 to -39	43	18	13	6	1	35
	-20 to -29	17	9	8	8	8	85
	-10 to -19	2	1	1	1	4	130
	0 to -9	1	1			3	157

TABLE 8.34

Frequency of Specified Duration for Maximum Temperature

STATION: Snag 08/43 – 09/66

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
<-60																														
-55 to -59																														
-50 to -54	1				1																									
-45 to -49	9				3	2				3																				
-40 to -44	22				3	1				1																				
-35 to -39	32	1			4	3				1																				
-30 to -34	41	1			5	13	1			5																				
-25 to -29	68	1			4	24	3			6	2				3															
-20 to -24	89	6	1		9	52	5			5	9	3			5															
-15 to -19	78	6			6	71	3			6	35	2			6	1				1										
-10 to -14	51	4			5	64	7	2		10	49	3			6	8				3										
-5 to -9	21	1			4	55	3			6	74	4	1		10	20				3	1				1					
0 to -4	7				3	24	2	1		8	86	8	2		8	45	2			4	3				2					
1 to 5	4				2	16				2	58	15	2		11	85	14	1		10	17				3	2				1
6 to 10	1				1	5				1	30	2			7	84	20	6		14	52	9	2		10	8				1
11 to 15											3				2	35	5			5	98	16	1		9	73	2			5
16 to 20																6		1		11	72	17	3		10	114	16	2		10
21 to 25																1				2	27	1	1		10	73	19	2		11
26 to 30																					7	1			4	25	3			7
>30																										2				2

	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																										9	1			4
-40 to -44																					1				2	17				3
-35 to -39																					8				3	30				2
-30 to -34																					14	1			5	42				2
-25 to -29																					30				3	56	4			5
-20 to -24																					39	2			5	81	10	2		9
-15 to -19																3				2	55	10			6	86	10			5
-10 to -14																15	3			6	80	10	1		8	49	3			6
-5 to -9																44	5	3		8	59	7	2		13	14	3			4
0 to -4											5	1			4	66	20	2		9	22	4			4	4				2
1 to 5						1				1	30	6			7	67	17	1		8	7				3	1				1
6 to 10	4				1	17				3	85	12	1		11	53	6			6	3				1					
11 to 15	53				3	97	5			5	97	19	2		10	17				3										
16 to 20	128	9			6	118	20	2		8	70	3	1		8	1				1										
21 to 25	125	13	3		11	66	17			6	22	1			4															
26 to 30	43	8	1		9	21	2	1		9	1				1															
>30	4				2	1				1																				

TABLE 8.34

Frequency of Specified Duration for Minimum Temperature

STATION: Snag A 08/1943 09/1966

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	<40	33	15	4			13
	-30 to -39	47	18	14	5		25
	-20 to -29	6	2	3	10	6	47
	-10 to -19	1		1			13
FEBRUARY	<40	27	5	3			9
	-30 to -39	49	17	6	1		21
	-20 to -29	25	9	8	8		25
	-10 to -19	3	1	2	3	5	45
	0 to -9					1	73
MARCH	<40	18	1	1			9
	-30 to -39	59	12	3			11
	-20 to -29	58	26	9	3		23
	-10 to -19	13	3	10	7		25
	0 to -9				2		20
APRIL	<40	1					3
	-30 to -39	10					3
	-20 to -29	27	7				6
	-10 to -19	61	16	5			14
	0 to -9	2	2	5	1	1	36
MAY	-10 to -19	5	2				4
	0 to -9	89	16	2			9
JUNE	0 to -9	38	1				7
JULY	0 to -9	6					1
AUGUST	-10 to -19	1					1
	0 to -9	74	7				7
SEPTEMBER	-10 to -19	19	1				4
	0 to -9	90	17	6	2	9	235
OCTOBER	-30 to -39	5					3
	-20 to -29	33	4	3			11
	-10 to -19	62	17	10	4	9	166
	0 to -9	6	2	1		14	230
NOVEMBER	<40	18	6				6
	-30 to -39	45	6	9	1		15
	-20 to -29	56	11	9	12	6	86
	-10 to -19	5	3	1		14	155
DECEMBER	<40	29	11	4	1		17
	-30 to -39	47	17	15	6		21
	-20 to -29	10	2	8	6	8	64

TABLE 8.35

Frequency of Specified Duration for Maximum Temperature

STATION: Swift River 11/66 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44	2				2																									
-35 to -39	6				2	1				1																				
-30 to -34	20				3	3				3																				
-25 to -29	38	1			4	7				3	1				1															
-20 to -24	49	1			4	20				3	4				3															
-15 to -19	37	3			5	31	3			5	9	1			6															
-10 to -14	39				3	30	2			5	17	4			6	1				1										
-5 to -9	31	1			4	43	3			5	35	2			5	9				2										
0 to -4	28	3			7	48	6			7	58	10	1		13	30	3			5										
1 to 5	15	1			4	29	5			4	52	9	3		12	51	17	5		12	21	1			4	1				1
6 to 10	2				1	5				2	12				3	48	8	1		14	54	13	2		8	17				3
11 to 15						1				1						7	2	1		8	58	13	2		9	57	7			7
16 to 20																1	1			4	29	1			4	69	8			6
21 to 25																					5				3	31	2			6
26 to 30																										6	1			5
>30																										2				1
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																														
-35 to -39																										5				3
-30 to -34																										9	1			4
-25 to -29																					4				2	18	2			4
-20 to -24																					16				3	31				3
-15 to -19																1				1	27	2			6	41	4			5
-10 to -14																1				1	37	1			4	49	5			5
-5 to -9																6				3	51	3			4	39	4			6
0 to -4											1				2	34	5			6	46	6	1		9	34	4			5
1 to 5											13	2	1		11	57	16	2		11	33	4			5	13				2
6 to 10	10				3	13				3	60	7			7	38	6			5	6				2					
11 to 15	53	6	1		8	47	8	3		14	52	8	2		10	8	2			5										
16 to 20	76	13			6	53	11			6	15	3			7	2				1										
21 to 25	38	10			7	35	3			7	7				3															
26 to 30	13	1			5	8				3	1				1															
>30																														

TABLE 8.35 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Swift River 11/1966 – 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS) 1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	<-40	25	4				6
	-30 to -39	27	12	9			12
	-20 to -29	22	9	7	7		30
	-10 to -19	9	6	5	9	3	41
	0 to -9	3	3	1	3	4	76
FEBRUARY	<-40	11					3
	-30 to -39	20	9	1			8
	-20 to -29	38	15	4	4		28
	-10 to -19	18	6	8	7	2	33
	0 to -9	1		2	2	6	85
MARCH	<-40	4					3
	-30 to -39	19	1				5
	-20 to -29	53	7	1	1		16
	-10 to -19	30	11	13	5		25
	0 to -9	1	2	2	3	4	49
APRIL	-30 to -39	3					1
	-20 to -29	13	1				4
	-10 to -19	55	10	1			10
	0 to -9	4	8	8	3	1	38
MAY	-10 to -19	4					2
	0 to -9	68	21	2			9
JUNE	0 to -9	53	1				6
JULY	0 to -9	17					3
AUGUST	0 to -9	40	2				7
SEPTEMBER	-10 to -19	7					2
	0 to -9	60	15	2	1		15
OCTOBER	-20 to -29	2					2
	-10 to -19	34	6		1		18
	0 to -9	21	17	5	4	7	150
NOVEMBER	<-40	5					1
	-30 to -39	18	4	1			9
	-20 to -29	28	15	5	2		21
	-10 to -19	29	15	6	13	3	83
	0 to -9	1	3	4	3	7	98
DECEMBER	<-40	15	4				6
	-30 to -39	29	12	3			14
	-20 to -29	36	11	9	5	1	46
	-10 to -19	6	9	6	8	3	89
	0 to -9	3	4	4	3	5	153

TABLE 8.36

Frequency of Specified Duration for Maximum Temperature

STATION: Teslin 10/43 – 08/80

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	**JANUARY**					**FEBRUARY**					**MARCH**					**APRIL**					**MAY**					**JUNE**				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44	2	1			4	1				1																				
-35 to -39	20	3			5	1				3																				
-30 to -34	43	6			6	4				2																				
-25 to -29	79	3			5	11	2			4	1				1															
-20 to -24	88	2	1		8	48	3			6	4				1															
-15 to -19	106	6			4	84	5			5	24	1			5															
-10 to -14	106	7			7	97	7			5	56	3			4	2				1										
-5 to -9	82	4			5	93	4	1		8	81	7	2		10	11				3										
0 to -4	70	6			5	115	9			7	119	14	5		9	47	1			5										
1 to 5	43	4			6	37	12			6	102	24	14	1	18	110	33	9		12	19	1			4	1				1
6 to 10	6				2	15	2			4	41	6	1		8	112	31	12	1	16	100	18	4		10	16				3
11 to 15						1				1						21	10	1		12	148	32	6		14	116	14	3		10
16 to 20																1	3			5	99	13	2		8	177	30	2	1	21
21 to 25																					33	4			6	100	19	3		10
26 to 30																					1	1			4	22	3	1		9
>30																										1	1			4
	JULY					**AUGUST**					**SEPTEMBER**					**OCTOBER**					**NOVEMBER**					**DECEMBER**				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																										7				2
-35 to -39																										18	1			5
-30 to -34																					2				2	31	1			4
-25 to -29																					7	2			6	50	6			5
-20 to -24																					30	2			5	66	4			4
-15 to -19																					61	1			5	99	5			7
-10 to -14																3				1	75	4	1		8	104	5			7
-5 to -9																22	1			4	85	18	1		8	110	10			7
0 to -4												1			5	59	10	2		10	115	15			7	101	8			7
1 to 5						1				1	17	3			6	134	30	4		13	87	20			7	47	7			5
6 to 10						21				3	107	22	3		13	132	33	6		12	32	2			5	6				3
11 to 15	98	1			4	113	24	4		9	145	34	9	1	15	40	3			5										
16 to 20	168	35	5		10	157	35	5		11	85	10	2		9	4				2										
21 to 25	146	25	1		9	95	15	3		10	19	2			4															
26 to 30	40	12			6	24	4			7	1				1															
>30	2				3																									

TABLE 8.36 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Teslin A 10/1943 08/1980

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	<-40	34	15	2			10
	-30 to -39	44	22	16	1		26
	-20 to -29	51	21	15	14	1	32
	-10 to -19	14	12	8	13	9	47
	0 to -9		4		1	2	68
FEBRUARY	<-40	11	2				4
	-30 to -39	45	8	4			9
	-20 to -29	66	24	12	4		27
	-10 to -19	37	16	19	12	1	32
	0 to -9	2	4			3	85
MARCH	<-40	1					1
	-30 to -39	27					3
	-20 to -29	74	15	5			13
	-10 to -19	95	16	18	7		25
	0 to -9	1	1	1	3	8	60
APRIL	-20 to -29	11					3
	-10 to -19	73	12	1			8
	0 to -9	10	18	12	5	2	41
MAY	-20 to -29	1					1
	-10 to -19	3					1
	0 to -9	153	42	4	1		20
JUNE	0 to -9	67	2				5
JULY	0 to -9	7					1
AUGUST	0 to -9	43	1				4
SEPTEMBER	-10 to -19	3					1
	0 to -9	148	16	6	1		18
OCTOBER	-20 to -29	4					3
	-10 to -19	47	10	2			11
	0 to -9	96	28	17	5	19	200
NOVEMBER	<-40	2					2
	-30 to -39	18	4	2			8
	-20 to -29	35	11	8	6		24
	-10 to -19	67	24	13	9	12	109
	0 to -9	11	4	1	2	19	192
DECEMBER	<-40	23	6	2			10
	-30 to -39	26	13	13	2		21
	-20 to -29	61	19	10	10	3	55
	-10 to -19	21	18	10	12	12	85
	0 to -9	4	4			7	132

TABLE 8.37

Frequency of Specified Duration for Maximum Temperature

STATION: Tuchitua 01/67 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
≤-60																														
-55 to -59																														
-50 to -54																														
-45 to -49	3				3																									
-40 to -44	12				3	1				2																				
-35 to -39	21	1			5	2				1																				
-30 to -34	23	2			4	4				2																				
-25 to -29	29	3			4	9	1	1		8																				
-20 to -24	45		1		9	17	3			4	2				2															
-15 to -19	40	2			5	37	2			4	5	2			6															
-10 to -14	29	2			7	36	3	1		10	20	1	1		8	1				1										
-5 to -9	30				3	42	4			5	39	6			5	3				2										
0 to -4	16				3	35	6	1		8	56	6	1		8	20				3	1				1					
1 to 5	6				2	20				3	45	11	2		8	50	4	4		11	10				2					
6 to 10						3	1			6	21	3			4	52	14	5		11	45	7			6	8				2
11 to 15											1				1	25	2			4	63	10	2		9	44	6			7
16 to 20																3	1			5	46	4	2		8	79	8	3		11
21 to 25																1				2	11	2			5	52	6			5
26 to 30																										11	1			6
>30																										3				1
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
≤-60																														
-55 to -59																														
-50 to -54																										1				1
-45 to -49																										3	1			5
-40 to -44																										4	1			9
-35 to -39																										13				3
-30 to -34																					2				2	18				3
-25 to -29																					9				3	27	1			4
-20 to -24																					20	1			6	45	1			4
-15 to -19																1				3	26	2	2		8	48	5			6
-10 to -14																6	4			4	41	7			6	43	4			7
-5 to -9											1				1	44	2	1		9	58	6			7	22	2			5
0 to -4											1				3	71	9	2		10	45	2			4	11				3
1 to 5											9		1		12	51	7	2		8	21				3	1				2
6 to 10	1				1	10				2	41	12			7	13	1			4	3				2					
11 to 15	22	1			4	40	6	3		14	49	16	2		14	1				1										
16 to 20	56	13	3		12	58	14	2		12	28	3	1		10															
21 to 25	56	11	1		8	49	2			4	6				3															
26 to 30	11	4			6	16	1			5	1				2															
>30	2				1	1				1																				

TABLE 8.37 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Tuchitua 01/1967 – 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS) 1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	≤-40	14	12	4	1		15
	-30 to -39	20	13	9	4		30
	-20 to -29	19	9	2	10	1	31
	-10 to -19	4	14	1	1	5	77
	0 to -9	1	15	1	1	4	119
FEBRUARY	≤-40	16	4	1			8
	-30 to -39	24	9	4	1		17
	-20 to -29	21	15	9	3		26
	-10 to -19	4	16	2	3	5	49
	0 to -9		15		1	3	55
MARCH	≤-40	6					3
	-30 to -39	22	9				7
	-20 to -29	39	18	4	1		15
	-10 to -19	11	15	11	3		19
	0 to -9		10	3		2	49
APRIL	-30 to -39	3					2
	-20 to -29	11	2				5
	-10 to -19	40	9	1			13
	0 to -9	9	11	6	2	1	33
MAY	-10 to -19	3					2
	0 to -9	61	29				7
JUNE	0 to -9	34					3
JULY	0 to -9	5					2
AUGUST	0 to -9	29	3				7
SEPTEMBER	-10 to -19	4	1				4
	0 to -9	60	20	8	2		17
OCTOBER	-20 to -29	4	1				4
	-10 to -19	40	14	4		2	66
	0 to -9	13	20	4	7	8	207
NOVEMBER	≤-40	5	1				4
	-30 to -39	15	4	3			12
	-20 to -29	35	13	4	3	3	87
	-10 to -19	20	16	3	2	9	134
	0 to -9	3	16			8	181
DECEMBER	≤-40	21	5	3			13
	-30 to -39	30	14	6	2		18
	-20 to -29	19	24	4	4	2	79
	-10 to -19	5	11	1		3	104
	0 to -9	5	11	1		1	144

TABLE 8.38

Frequency of Specified Duration for Maximum Temperature

STATION: Watson Lake 10/38 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49	4				3																									
-40 to -44	27	2			4	2				2																				
-35 to -39	46	5			6	5				2																				
-30 to -34	70	3			4	14				3																				
-25 to -29	107	7			7	37	3			5	2				1															
-20 to -24	134	11			7	68	10	1		8	8	1			4															
-15 to -19	156	7			7	107	14	1		8	35	5			5															
-10 to -14	114	8			6	113	6	1		10	80	4			4	3				2										
-5 to -9	66	1			4	108	6	1		9	114	7			5	20				3										
0 to -4	48	3			7	104	6			6	156	19	1		10	52	5			6	2				2					
1 to 5	26	2			5	68	2			4	121	35	3		12	145	8	4		12	20				2	1				1
6 to 10	5				2	14				2	67	7		1	18	142	42	14	2	18	114	10	1		8	16				3
11 to 15											9				1	66	12	1		8	189	36	6		10	113	10			6
16 to 20																9	3			5	151	24	2		8	211	42	5		12
21 to 25																					51	5	1		9	165	22	3		9
26 to 30																					7	2			5	42	6			7
>30																					1				1	2	1			4

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																										6				2
-40 to -44																										24	2			5
-35 to -39																					4				3	29	1			4
-30 to -34																					8				3	48	2			4
-25 to -29																					29	1			4	91	2			4
-20 to -24																					51	4			7	147	6	1		8
-15 to -19																1				1	96	6	1		8	182	13			7
-10 to -14																7	1			4	134	13			7	129	9			6
-5 to -9																27	7			7	135	11	1		9	71	2			6
0 to -4											4				3	91	13	1		13	128	5			5	44	3			7
1 to 5											29	4	1		9	187	19	6		14	73	4			5	28	1			4
6 to 10	1				1	12				3	117	22	4		12	171	30	4		8	20	2			6	3				3
11 to 15	70				3	101	15	3		13	150	54	7		13	75	3			5	2				1					
16 to 20	175	33	6		12	174	33	9		11	114	12	1		8	11				2										
21 to 25	26	34	2		10	141	27	3		10	41	6			6	1				1										
26 to 30	74	15			7	51	8	1		9	5				3															
>30	8				3	3				2																				

TABLE 8.38 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Watson Lake A 10/1938 – 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	<-40	47	20	9	1		19
	-30 to -39	79	27	18	11		24
	-20 to -29	30	17	14	18	8	37
	-10 to -19	6	2	2		9	78
	0 to -9					2	87
FEBRUARY	<-40	38	7				7
	-30 to -39	67	25	10			13
	-20 to -29	57	37	18	13		30
	-10 to -19	16	6	5	10	5	44
	0 to -9					1	72
MARCH	<-40	14					2
	-30 to -39	64	14	1			11
	-20 to -29	119	37	10			13
	-10 to -19	64	34	17	10	1	31
	0 to -9		1	1	2		20
APRIL	-30 to -39	5					2
	-20 to -29	32	1	1			8
	-10 to -19	105	18	4			10
	0 to -9	35	20	24	7		29
MAY	-10 to -19	3					1
	0 to -9	189	29	2			8
JUNE	0 to -9	18	2				4
JULY							–
AUGUST	0 to -9	14					3
SEPTEMBER	-10 to -19	4					2
	0 to -9	152	18	8			11
OCTOBER	-30 to -39	1					1
	-20 to -29	14	2				4
	-10 to -19	58	14	5	4	3	142
	0 to -9	98	30	20	6	33	205
NOVEMBER	<-40	12	3				7
	-30 to -39	43	18	4	1		21
	-20 to -29	81	32	18	10	6	86
	-10 to -19	37	15	14	11	31	136
	0 to -9	5		1		14	-165
DECEMBER	<-40	39	14	7			13
	-30 to -39	78	25	19	7	1	49
	-20 to -29	42	23	17	23	7	73
	-10 to -19	2	3		3	12	102
	0 to -9					2	139

TABLE 8.39

Frequency of Specified Duration for Maximum Temperature

STATION: Whitehorse A (04/42 – 12/81

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
CONDITION (°C)	JANUARY					FEBRUARY					MARCH					APRIL					MAY					JUNE				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44	9	1			6	1				1																				
-35 to -39	34				3	4				1																				
-30 to -34	59	2			4	6		1		8																				
-25 to -29	83	4			5	25	2			4																				
-20 to -24	93	3			4	45	6			6	8	1			4															
-15 to -19	89	7			7	74	7			5	23	4			7															
-10 to -14	95	8			6	89	4	1		9	41	5			5	5				2										
-5 to -9	99	7			6	91	5			5	80	11			7	17				3										
0 to -4	77	9			5	117	16	1		9	127	16	3		12	47	3	1		8	1				1					
1 to 5	49	9			6	81	16	1		8	108	29	14	2	19	108	32	4		12	18				3					
6 to 10	11				2	18	1			4	54	7		1	18	104	36	13	3	19	107	17	1		8	20				3
11 to 15						2				1	3				1	32	9	1		11	170	40	7		10	133	9	1		10
16 to 20																9	1			4	123	22			7	163	45	6		11
21 to 25																2				3	38	2			5	116	17	3		10
26 to 30																					3	1			4	25	7	1		9
>30																										2	1			4

RANGES (DAYS)	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST	1 TO 3	4 TO 7	8 TO 14	15 TO 30	LONGEST
	JULY					AUGUST					SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER				
<-60																														
-55 to -59																														
-50 to -54																														
-45 to -49																														
-40 to -44																										4				3
-35 to -39																										23	1			4
-30 to -34																					5				2	39	4			6
-25 to -29																					12	1			5	57				3
-20 to -24																1				3	28				3	76	4			7
-15 to -19																7				3	58	3			6	103	3	1		8
-10 to -14																25	6			6	71	17			7	103	6			7
-5 to -9																67	8	1		9	98	9	2		8	113	6	1		9
0 to -4											5				3	157	28	6	1	15	126	14	1		8	102	16	1		8
1 to 5						1				1	25	2	1		12	139	32	7		12	100	16	1		10	45	12			5
6 to 10	3				1	18	1			4	131	20	2		14	51	5			5	34	3	1		9	3	1			6
11 to 15	89	1			4	132	18	4	1	20	169	39	4		11	5				1	2				1					
16 to 20	184	35	4		10	175	45	4		10	95	11	4		11															
21 to 25	175	27	4		12	114	17	1		8	23	1			6															
26 to 30	53	11			5	39	4			5	1				1															
>30	4				1																									

TABLE 8.39 Continued

Frequency of Specified Duration for Minimum Temperature

STATION: Whitehorse A 04/1942 – 12/1983

MONTH	CONDITION (°C)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	≤-40	47	11	2			10
	-30 to -39	41	28	11	3		23
	-20 to -29	66	18	16	12		29
	-10 to -19	22	13	14	11	12	48
	0 to -9			1		5	107
FEBRUARY	≤-40	12	2				5
	-30 to -39	47	13	2			9
	-20 to -29	67	24	16	3		28
	-10 to -19	39	21	20	9	2	33
	0 to -9	1			2	4	85
MARCH	≤-40	2					1
	-30 to -39	30	2	1			9
	-20 to -29	95	15	5			12
	-10 to -19	94	35	17	4		26
	0 to -9	6		1	6	5	43
APRIL	-20 to -29	17					3
	-10 to -19	69	11	2			8
	0 to -9	24	33	22	10		27
MAY	-10 to -19	1					2
	0 to -9	178	24	2			14
JUNE	0 to -9	32					3
JULY							-
AUGUST	0 to -9	29					3
SEPTEMBER	-10 to -19	5					2
	0 to -9	132	17	3			12
OCTOBER	-30 to -39	1					1
	-20 to -29	12		1			8
	-10 to -19	57	13	2	1		15
	0 to -9	107	30	23	12	15	172
NOVEMBER	≤-40	1					1
	-30 to -39	24	4	2			10
	-20 to -29	52	13	10	6		27
	-10 to -19	71	18	21	11	11	83
	0 to -9	12	2	3	7	24	184
DECEMBER	≤-40	30	8				7
	-30 to -39	41	21	10	3		18
	-20 to -29	65	21	13	11	5	50
	-10 to -19	41	16	17	13	9	72
	0 to -9	4	1			9	118

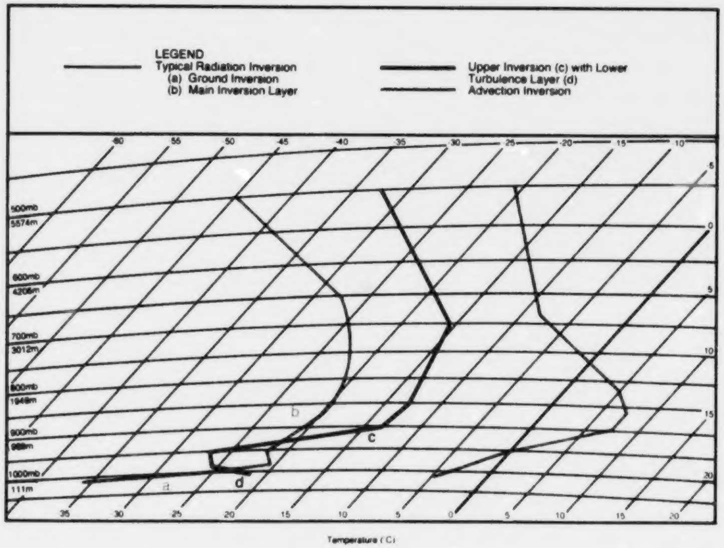


Figure 8.1 Forms of the arctic inversion

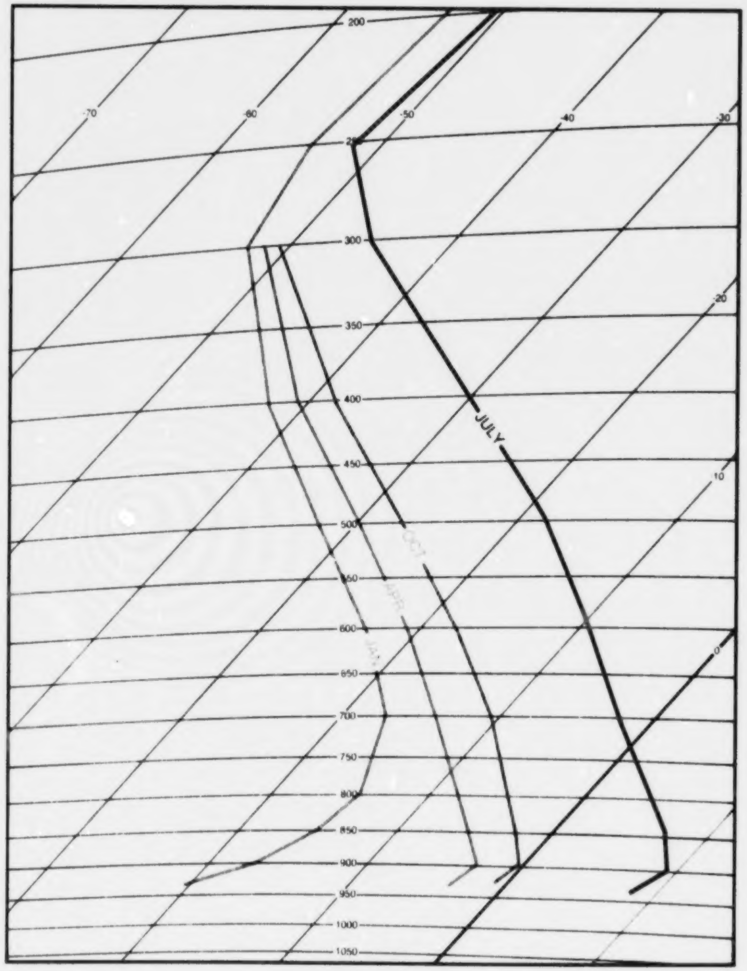


Figure 8.2 Mean temperature profiles (°C) for 1200 GMT at Whitehorse A, Yukon for the period 1961-1970

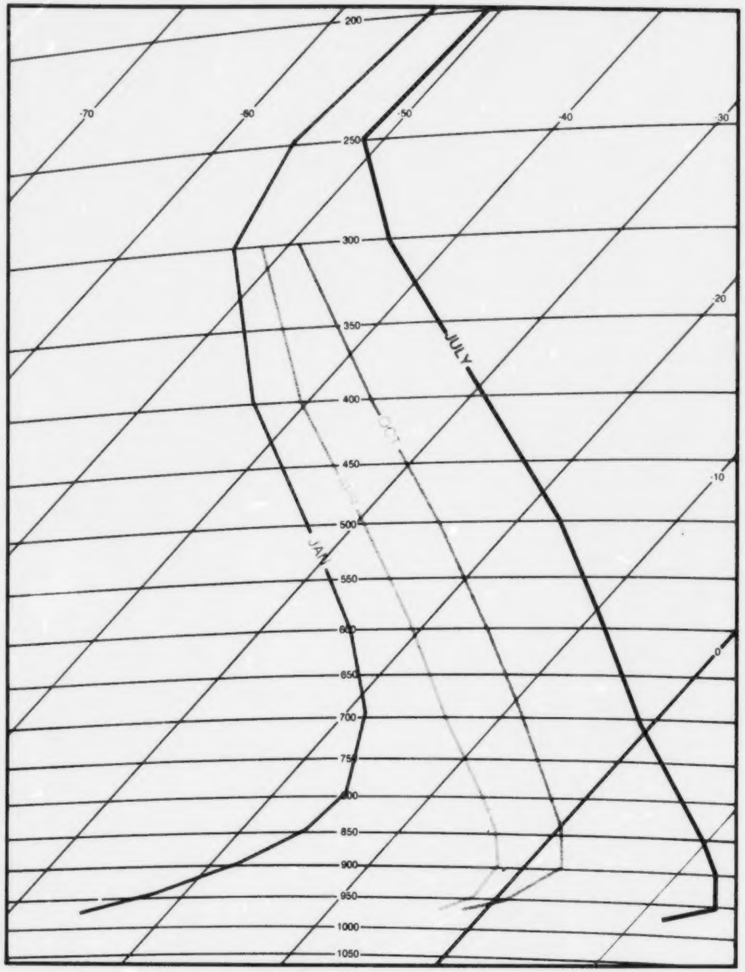


Figure 8.3 Mean temperature profiles (°C) for 1200 GMT at Fort Nelson A, B.C. for the period 1961-1970

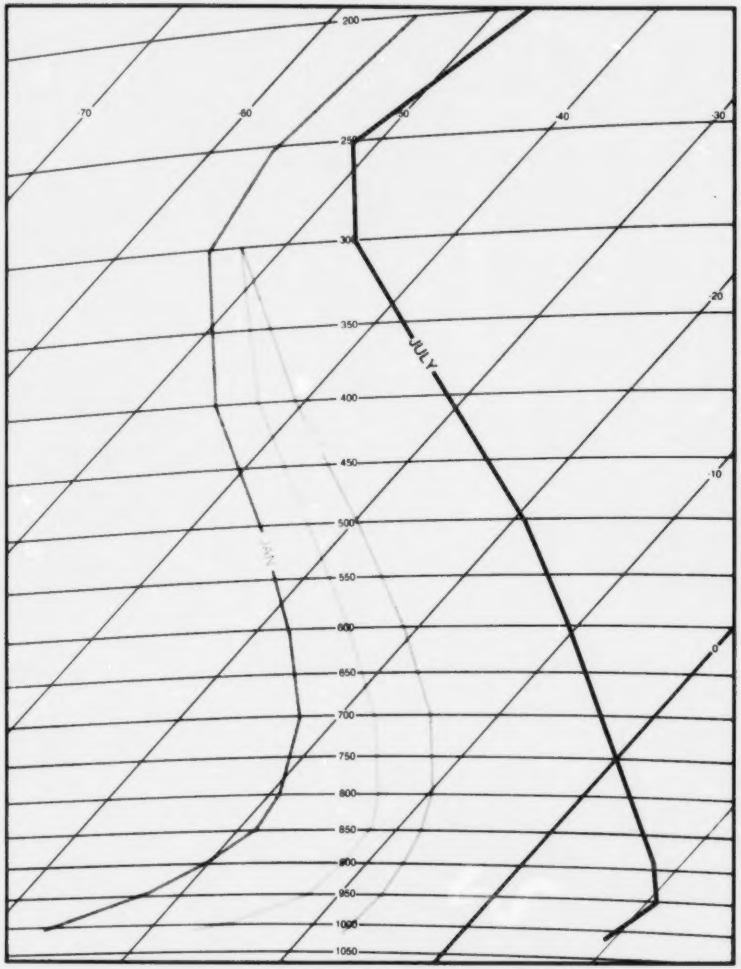


Figure 8.4 Mean temperature profiles (°C) for 1200 GMT at Inuvik A, N.W.T. for the period 1961-1970

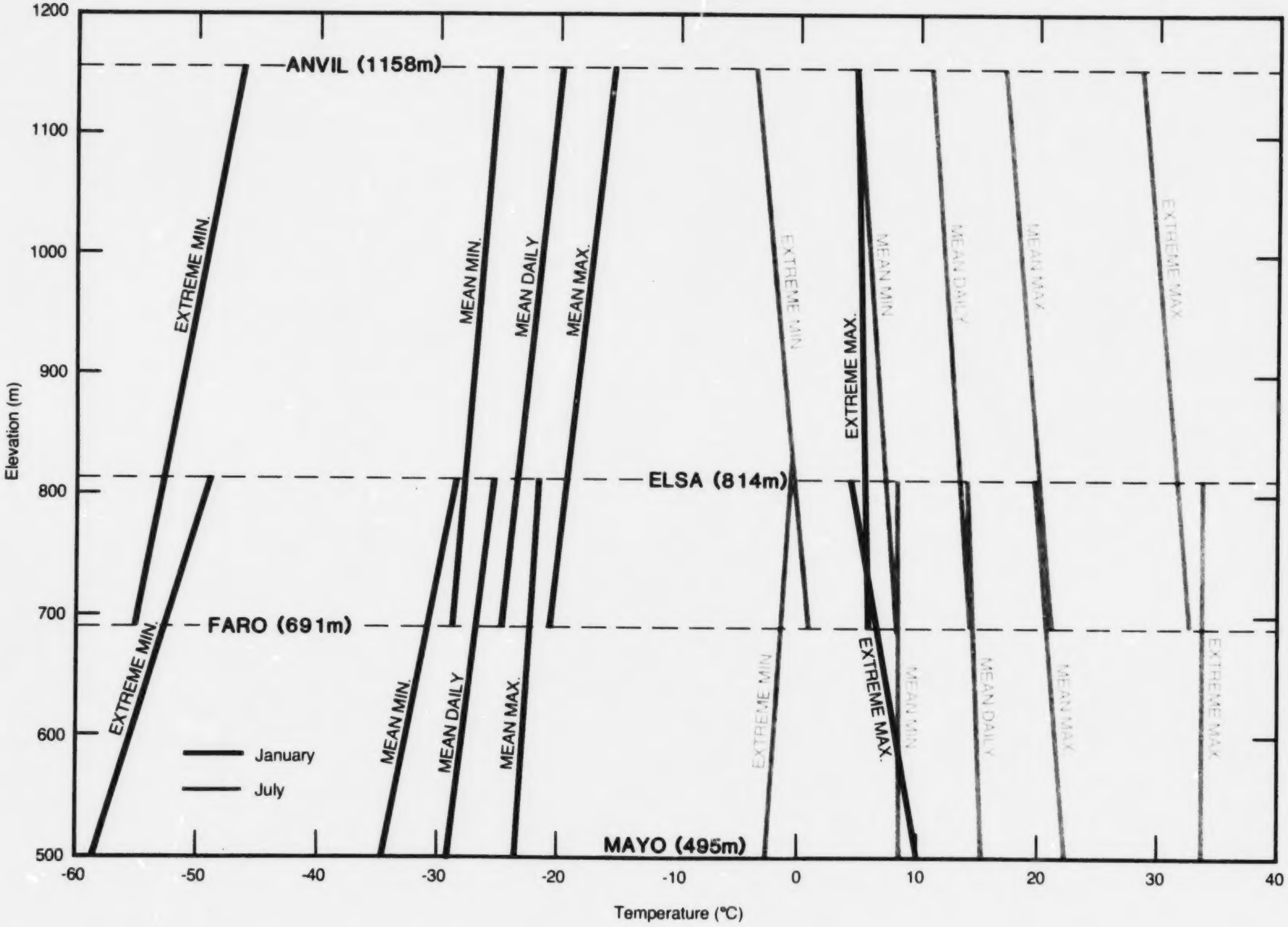


Figure 8.5 Lapse rates of mean and extreme temperatures between Faro and Anvil and between Mayo and Elsa for January and July

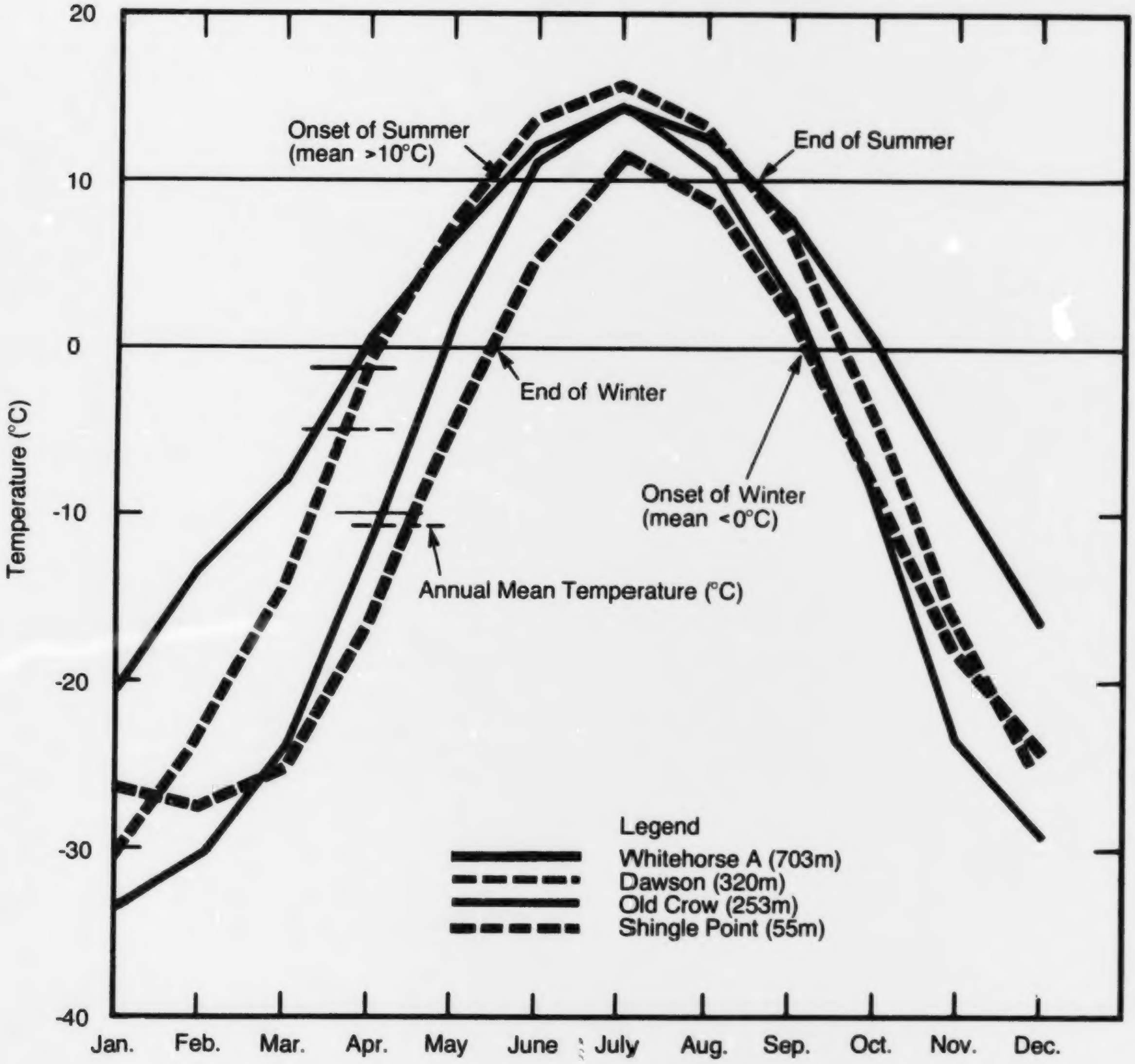


Figure 8.6 Mean monthly and annual temperatures for Whitehorse A, Dawson, Old Crow and Shingle Point

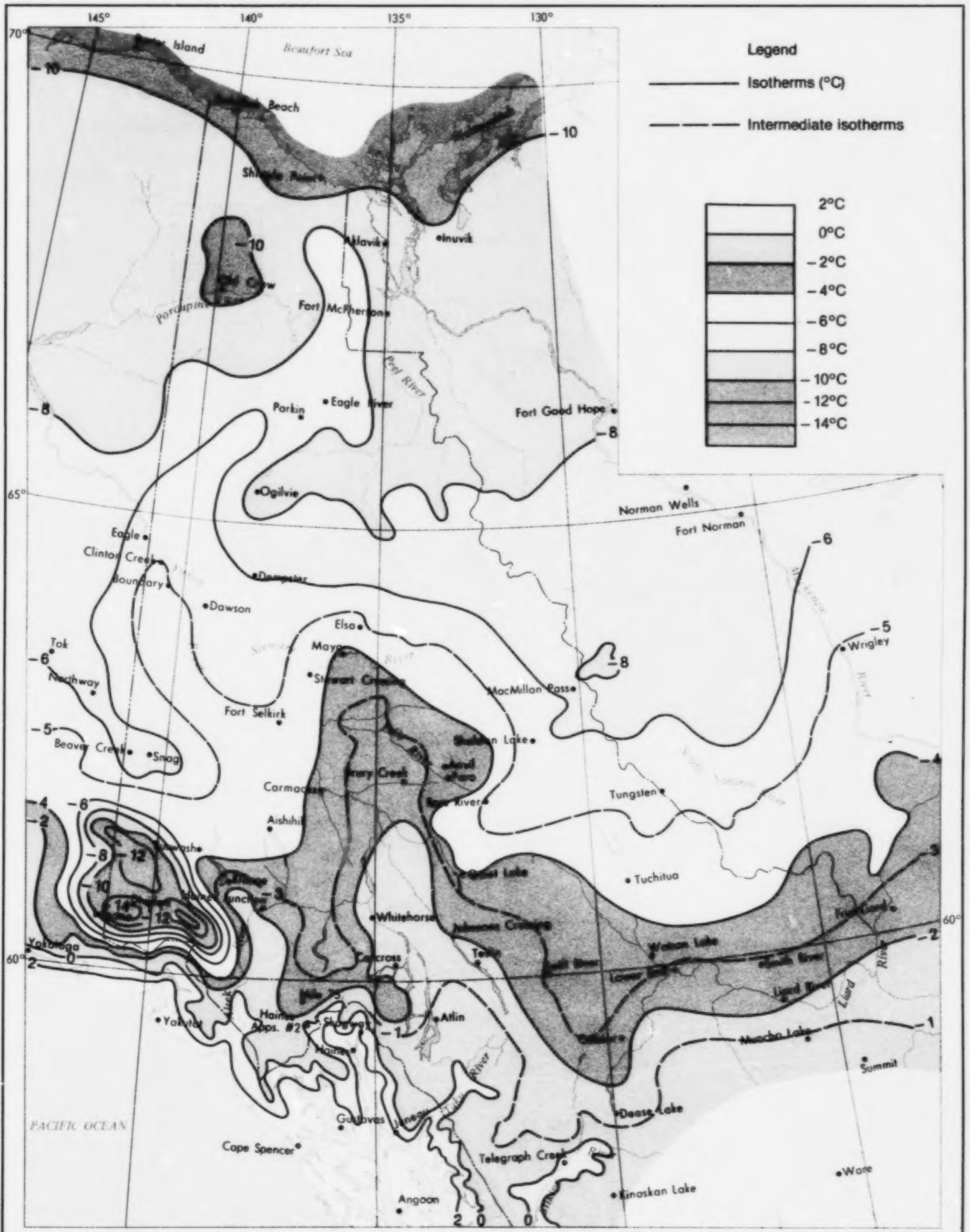

Legend
Isotherms (°C)
Intermediate isotherms
2°C
0°C
- 2°C
- 4°C
- 6°C
- 8°C
- 10°C
- 12°C
- 14°C
145°
140°
135°
130°
125°
70°
65°
60°
Beaufort Sea
Island
Beach
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Tok
Northway
Stewart Crossing
MacMillan Pass
Wrigley
Fort Selkirk
Sheldon Lake
Beaver Creek
Snag
Carmacks
Faro
Ross River
Tungsten
Aishihik
Burwash
Haines Junction
Quiet Lake
Tuchitua
Whitehorse
Johnsons Crossing
Teslin
Watson Lake
Lower Post
Fort Liard
Liard River
Yakutaga
Carcross
Atlin
Yakutat
Haines Apps. #2
Skagway
Haines
Muncho Lake
Summit
Cassiar
Dease Lake
Gustavus
Juneau
Cape Spencer
Telegraph Creek
Ware
Kinaskan Lake
Angoon
PACIFIC OCEAN
-10
-8
-6
-5
-4
-3
-2
-1
0
2
-12
-14

Figure 8.7 Annual mean daily temperature

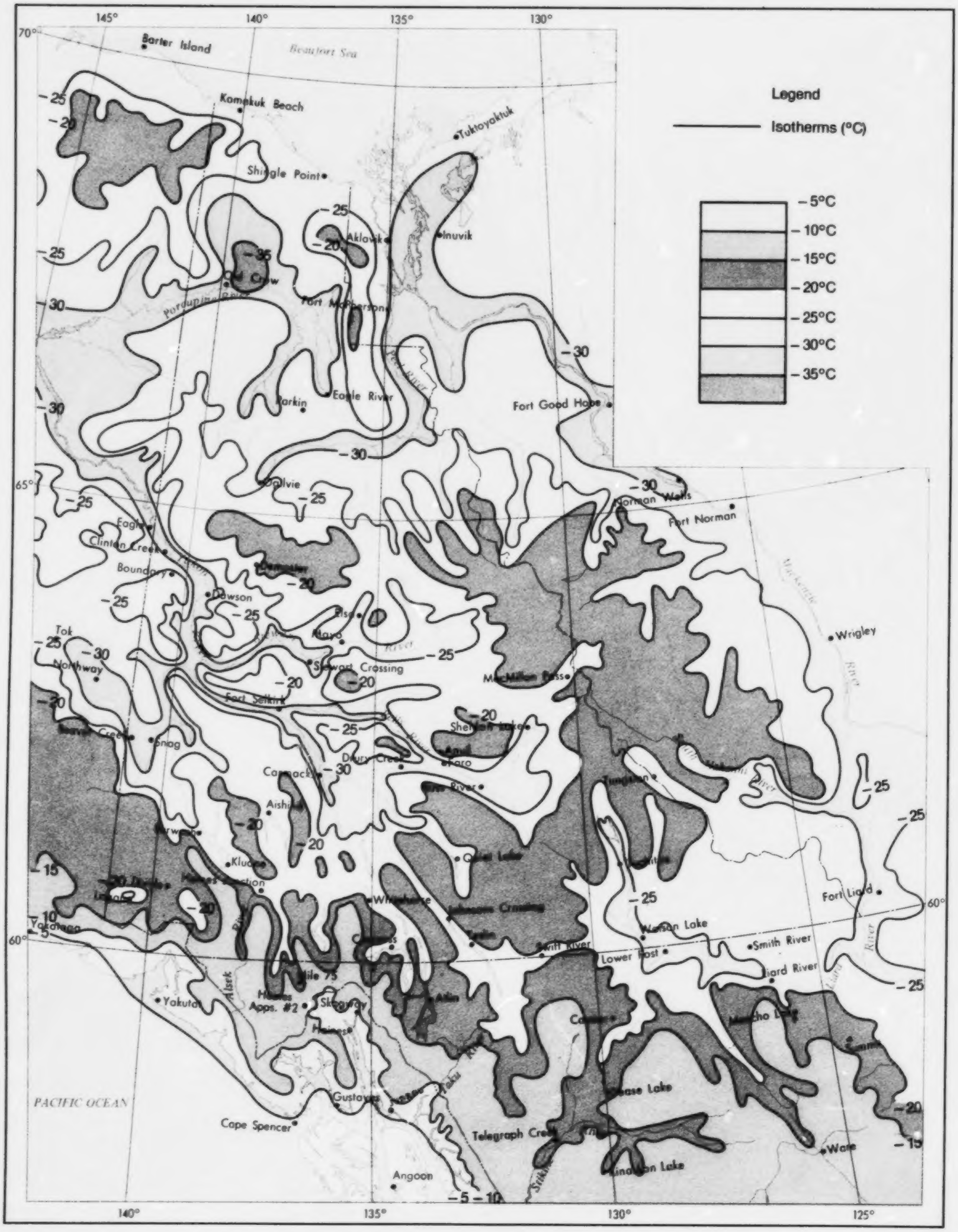

Legend
Isotherms (°C)
–5°C
–10°C
–15°C
–20°C
–25°C
–30°C
–35°C
145°
140°
135°
130°
125°
70°
65°
60°
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Eagle River
Parkin
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dawson
Elsa
Mayo
Wrigley
Tok
Northway
Stewart Crossing
MacMillan Pass
Fort Selkirk
Sheldon Lake
Beaver Creek
Snag
Drury Creek
Faro
Carmacks
Ross River
Tungsten
Aishihik
Burwash
Quiet Lake
Kluane
Haines Junction
Fort Liard
Yakutat
Whitehorse
Johnsons Crossing
Watson Lake
Smith River
Teslin
Swift River
Lower Post
Liard River
Mile 75
Haines Apps. #2
Skagway
Haines
Atlin
Cassiar
Muncho Lake
Yakutat
Dease Lake
Gustavus
Juneau
PACIFIC OCEAN
Cape Spencer
Telegraph Creek
Ware
Kinaskan Lake
Angoon
Alsek
Stikine
Taku River
Mackenzie River
Liard River
Peel River
Pelly River
Yukon River
–5
–10
–15
–20
–25
–30
–35

Figure 8.8 January mean daily temperature

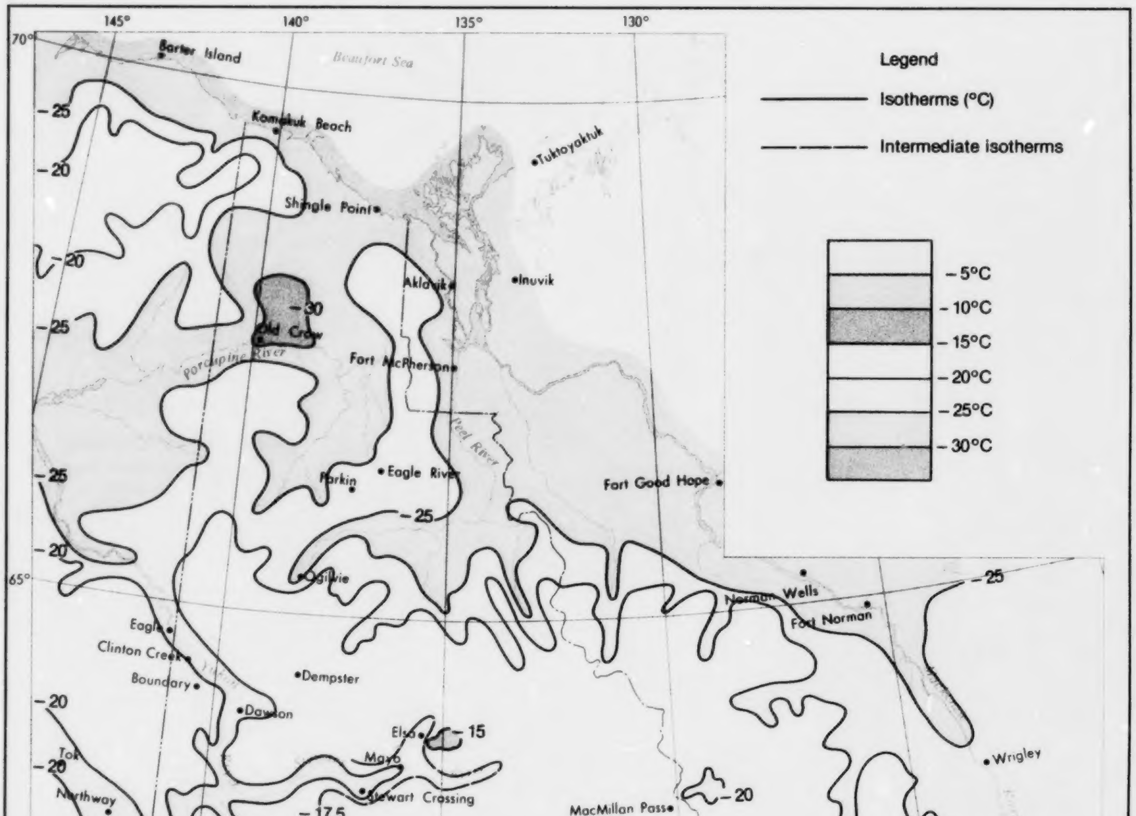

Legend
Isotherms (°C)
Intermediate isotherms
-5°C
-10°C
-15°C
-20°C
-25°C
-30°C
145°
140°
135°
130°
125°
70°
65°
60°
Beaufort Sea
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Tok
Northway
Stewart Crossing
MacMillan Pass
Wrigley
Fort Selkirk
Beaver Creek
Snag
Sheldon Lake
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Whitehorse
Johnsons Crossing
Fort Liard
Yakutat
Teslin
Watson Lake
Carcross
Swift River
Lower Post
Smith River
Liard River
Mile 75
Haines Apps. #2
Skagway
Atlin
Haines
Cassiar
Muncho Lake
Summit
Dease Lake
Gustavus
Juneau
Taku River
Cape Spencer
Telegraph Creek
Stikine River
Ware
Kinaskan Lake
Angoon
PACIFIC OCEAN
-25
-20
-30
-15
-17.5
-10
-5

Figure 8.9 February mean daily temperature

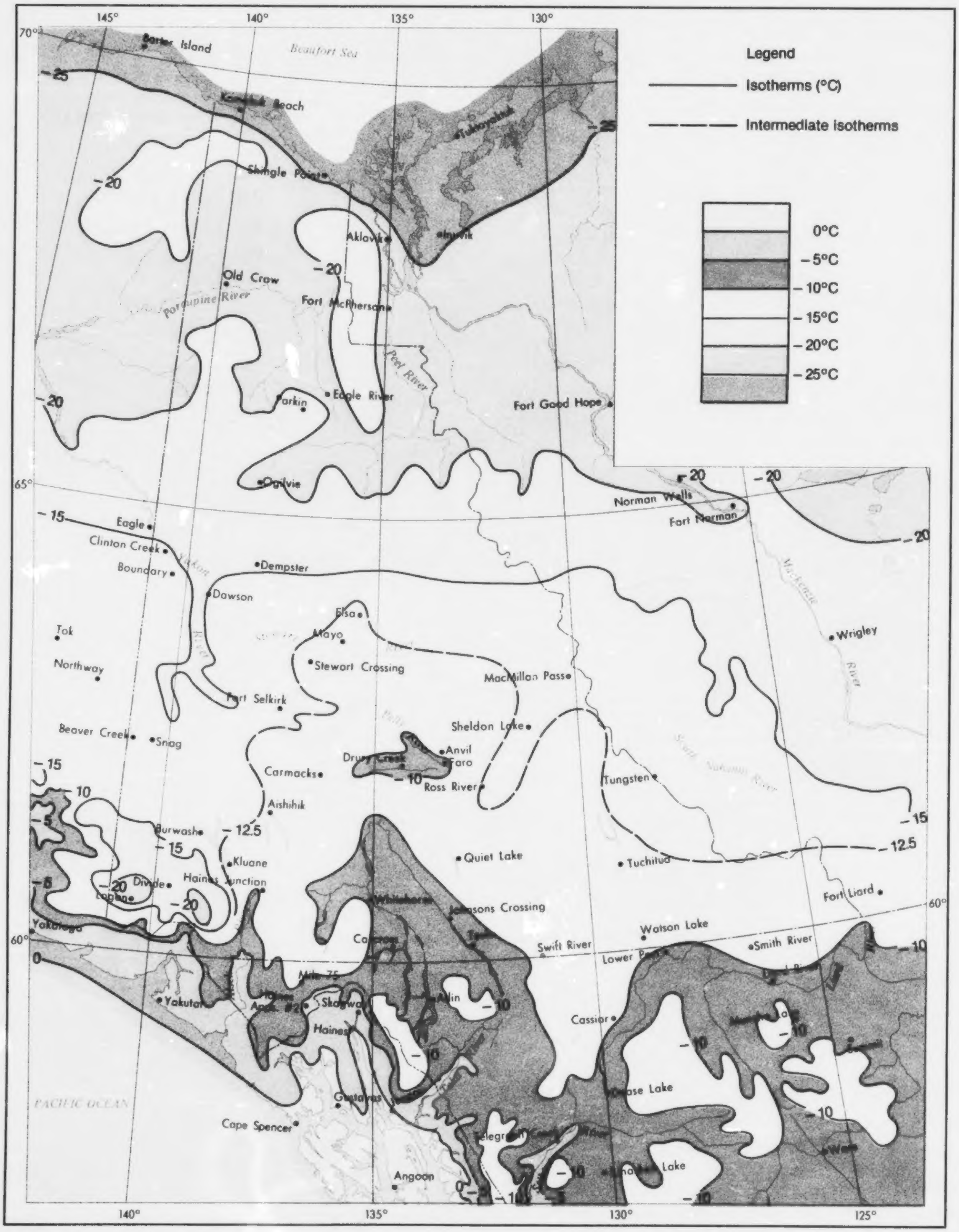

Legend
Isotherms (°C)
Intermediate isotherms
0°C
– 5°C
– 10°C
– 15°C
– 20°C
– 25°C
145°
140°
135°
130°
125°
70°
65°
60°
Beaufort Sea
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Eagle River
Parkin
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Yukon
Dempster
Dawson
Tok
Northway
Elsa
Mayo
Stewart Crossing
MacMillan Pass
Mackenzie
Wrigley
River
Fort Selkirk
Sheldon Lake
Beaver Creek
Snag
Drury Creek
Anvil
Faro
Carmacks
Ross River
Tungsten
Aishihik
South Nahanni River
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Logan
Haines Junction
Johnsons Crossing
Fort Liard
Yakataga
Watson Lake
Swift River
Smith River
Lower Post
Mile 75
Yakutat
Haines Apt. #2
Skagway
Atlin
Cassiar
Haines
Dease Lake
Gustavus
Cape Spencer
Angoon
Lake
PACIFIC OCEAN
– 25
– 20
– 15
– 12.5
– 10
– 5
0

Figure 8.10 March mean daily temperature

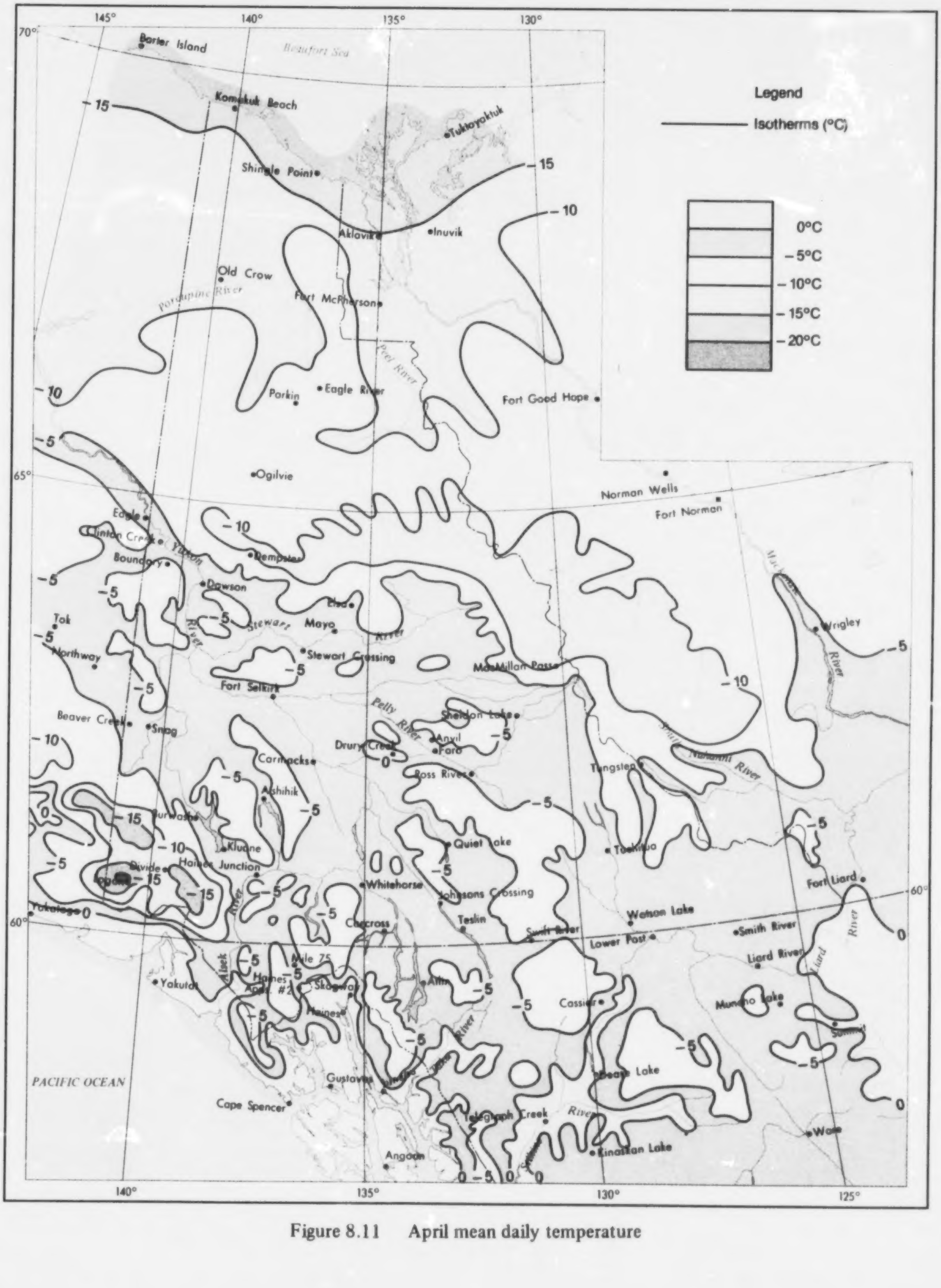

Legend
Isotherms (°C)
0°C
–5°C
–10°C
–15°C
–20°C
145°
140°
135°
130°
125°
70°
65°
60°
Beaufort Sea
PACIFIC OCEAN
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Yukon
Boundary
Dempster
Dawson
Elsa
Mayo
Stewart
River
Stewart Crossing
Tok
Northway
Fort Selkirk
MacMillan Pass
Mackenzie
Wrigley
River
Beaver Creek
Snag
Pelly River
Sheldon Lake
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
South Nahanni River
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Teslin
Swift River
Watson Lake
Carcross
Lower Post
Smith River
Liard River
Liard
River
Mile 75
Haines Apts. #2
Skagway
Atlin
Yakutat
Alsek
Haines
Cassiar
Muncho Lake
Summit
Gustavus
Dease Lake
Cape Spencer
Telegraph Creek
River
Ware
Angoon
Kinaskan Lake
Stikine
-15
-10
-5
0

Figure 8.11 April mean daily temperature

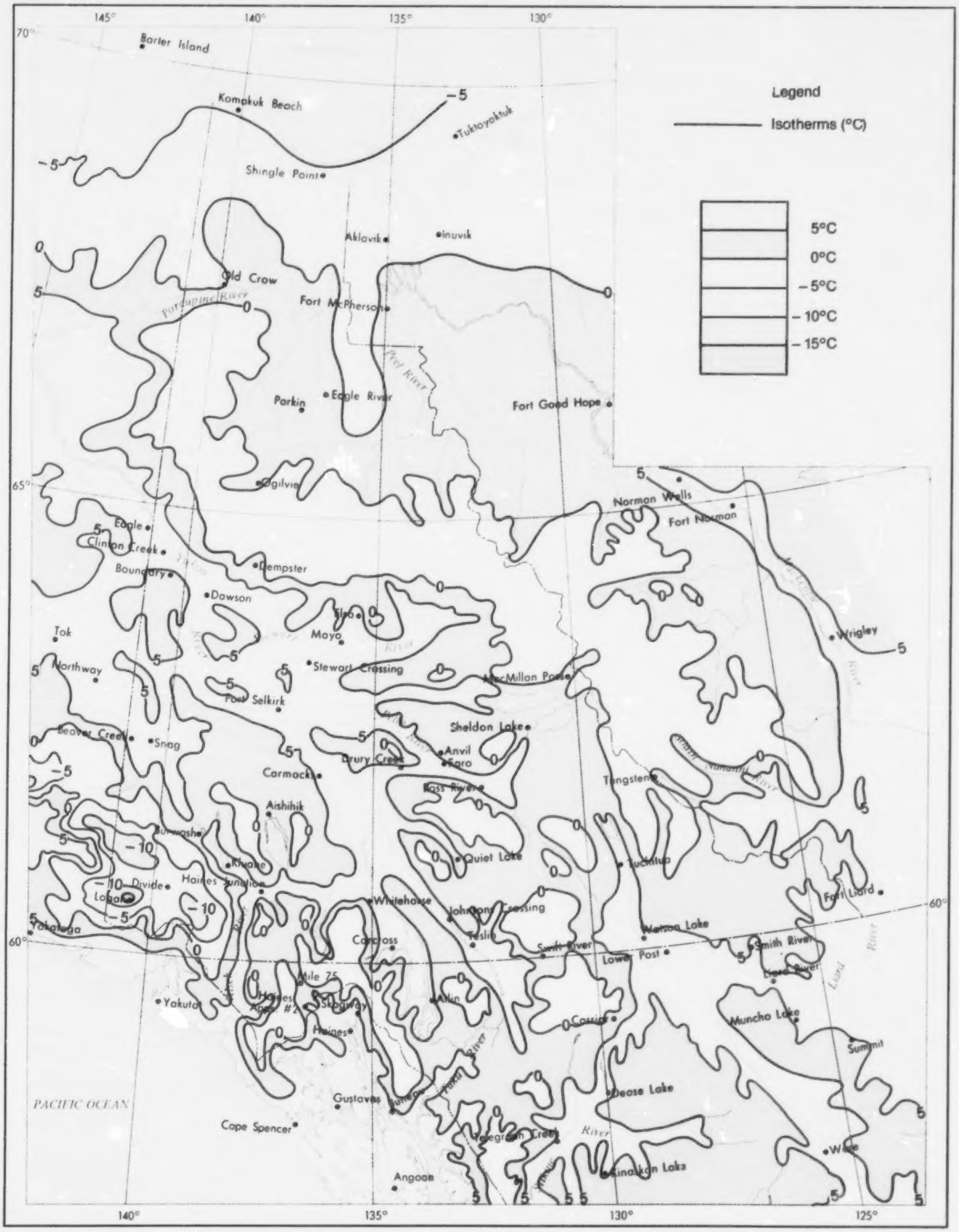

145°
140°
135°
130°
70°
65°
60°
125°
Legend
Isotherms (°C)
5°C
0°C
-5°C
-10°C
-15°C
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Stewart Crossing
Tok
Northway
Wrigley
MacMillan Pass
Fort Selkirk
Sheldon Lake
Beaver Creek
Snag
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
Aishihik
Burwash
Quiet Lake
Tuchitua
Kluane
Divide
Haines Junction
Logan
Yakataga
Whitehorse
Johnsons Crossing
Fort Liard
Teslin
Watson Lake
Carcross
Swift River
Lower Post
Smith River
Liard River
Mile 75
Haines Apex #2
Skagway
Atlin
Yakutat
Cassiar
Muncho Lake
Haines
Summit
PACIFIC OCEAN
Gustavus
Dease Lake
Cape Spencer
Telegraph Creek
Ware
Kinaskan Lake
Angoon
-5
0
5
-10

Figure 8.12 May mean daily temperature

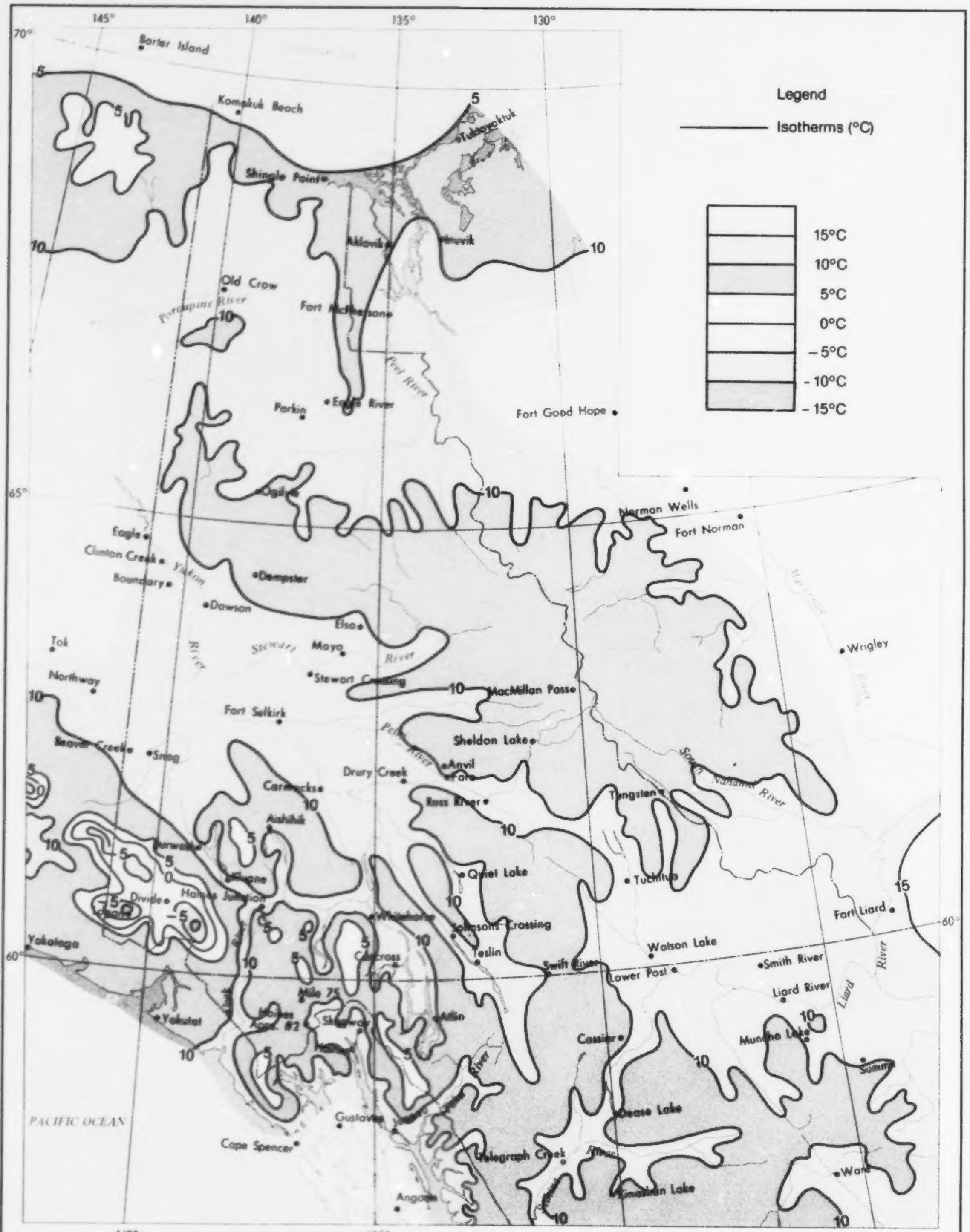

145°
140°
135°
130°
70°
65°
60°
125°
Legend
Isotherms (°C)
15°C
10°C
5°C
0°C
- 5°C
- 10°C
- 15°C
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Yukon
Boundary
Dempster
Dawson
Elsa
Tok
Stewart
Mayo
River
Stewart Crossing
Wrigley
Northway
MacMillan Pass
Fort Selkirk
Pelly River
Sheldon Lake
Beaver Creek
Snag
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
South Nahanni River
Aishihik
Burwash
Quiet Lake
Tuchitua
Haines Junction
Divide
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Mile 75
Yakutat
Haines Apt. 82
Skagway
Atlin
Cassiar
Muncho Lake
Summit
Gustavus
Dease Lake
Cape Spencer
Telegraph Creek
Ware
Angoon
Kinaskan Lake
PACIFIC OCEAN
Liard River
5
10
15
0
-5

Figure 8.13 June mean daily temperature

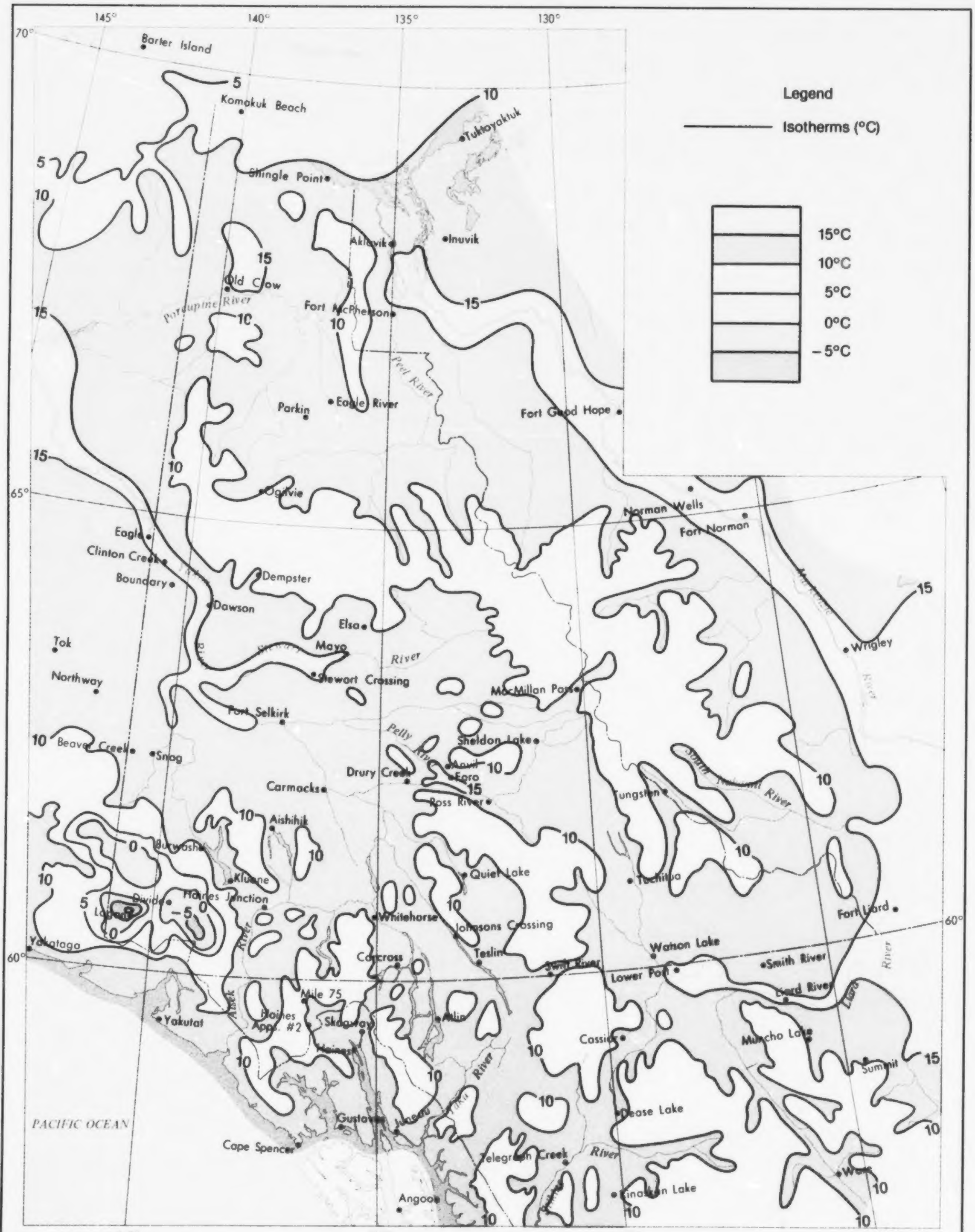

Legend
Isotherms (°C)
15°C
10°C
5°C
0°C
–5°C
145°
140°
135°
130°
125°
70°
65°
60°
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
River
Tok
Northway
Stewart Crossing
MacMillan Pass
Wrigley
Fort Selkirk
Pelly River
Sheldon Lake
Beaver Creek
Snag
Drury Creek
Anvil
Faro
Carmacks
Ross River
Tungsten
South Nahanni River
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Logan
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Mile 75
Alsek River
Haines Apts. #2
Skagway
Atlin
Yakutat
Haines
Cassiar
Muncho Lake
Summit
Taku River
Gustavus
Juneau
Dease Lake
PACIFIC OCEAN
Cape Spencer
Telegraph Creek
River
Angoon
Kinaskan Lake
Ware
5
10
15
0
–5

Figure 8.14 July mean daily temperature

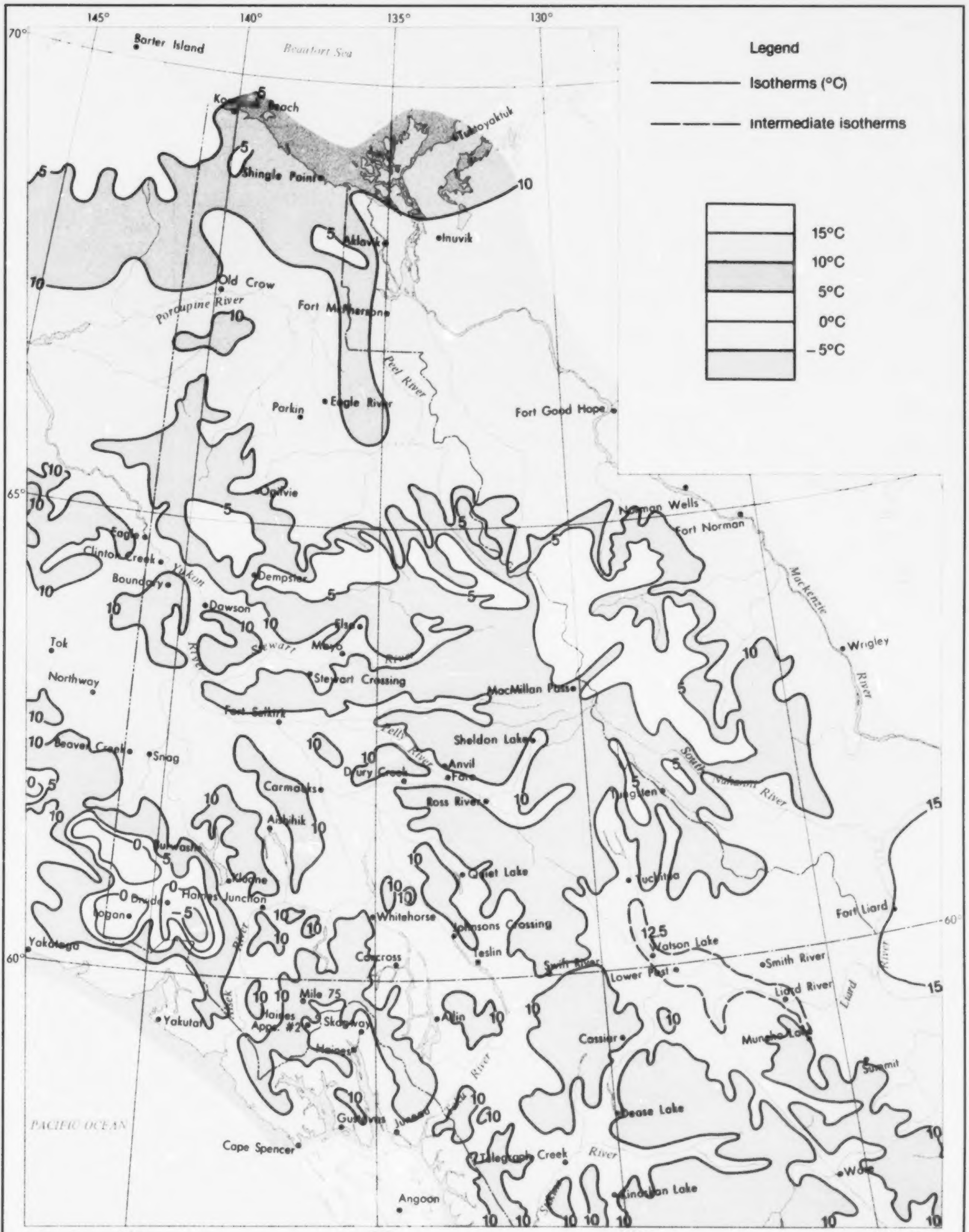

Legend
Isotherms (°C)
Intermediate isotherms
15°C
10°C
5°C
0°C
−5°C
145°
140°
135°
130°
125°
70°
65°
60°
Barter Island
Beaufort Sea
Shingle Point
Tuktoyaktuk
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Yukon River
Dempster
Dawson
Elsa
Mayo
Stewart River
Mackenzie River
Wrigley
Tok
Northway
Stewart Crossing
MacMillan Pass
Fort Selkirk
Pelly River
Sheldon Lake
Beaver Creek
Snag
Drury Creek
Anvil
Faro
South Nahanni River
Carmacks
Ross River
Tungsten
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Haines Junction
Bradford
Logan
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Teslin
Watson Lake
Carcross
Swift River
Lower Post
Smith River
Liard River
Mile 75
Yakutat
Haines Apt. #2
Skagway
Haines
Atlin
Cassiar
Muncho Lake
Summit
Gustavus
Juneau
Dease Lake
PACIFIC OCEAN
Cape Spencer
Telegraph Creek
Kinaskan Lake
Angoon
Ware
5
10
12.5
15
0
−5

Figure 8.15 August mean daily temperature

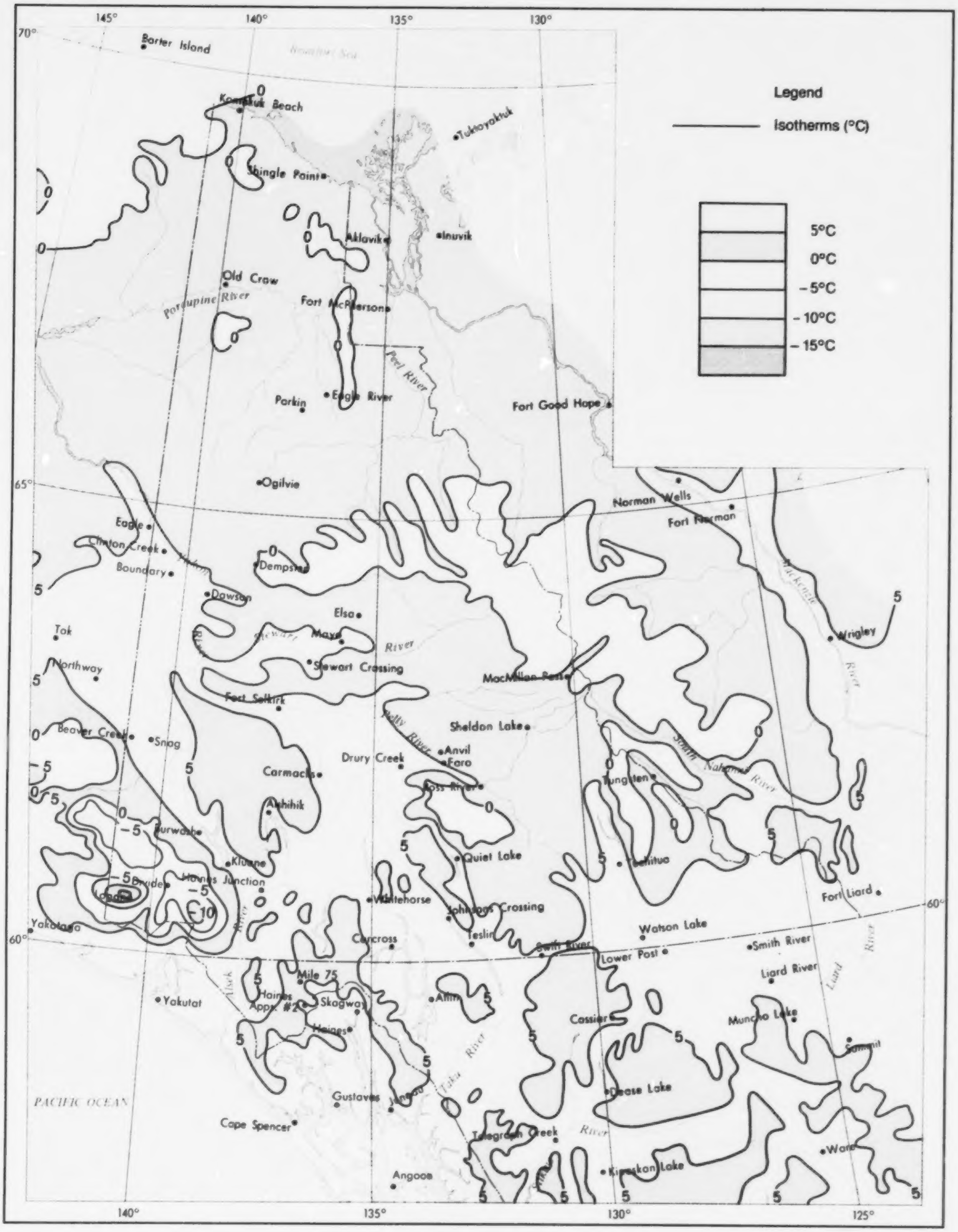

Legend
Isotherms (°C)
5°C
0°C
-5°C
-10°C
-15°C
145°
140°
135°
130°
125°
70°
65°
60°
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Stewart River
Stewart Crossing
Tok
Northway
Wrigley
Mackenzie River
MacMillan Pass
Fort Selkirk
Pelly River
Sheldon Lake
Beaver Creek
Snag
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
South Nahanni River
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Bryde
Haines Junction
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Mile 75
Haines Apt. #2
Skagway
Haines
Atlin
Yakutat
Cassiar
Muncho Lake
Summit
Taku River
Dease Lake
PACIFIC OCEAN
Gustavus
Juneau
Cape Spencer
Telegraph Creek
Stikine River
Ware
Kinaskan Lake
Angoon
0
5
-5
-10

Figure 8.16 September mean daily temperature

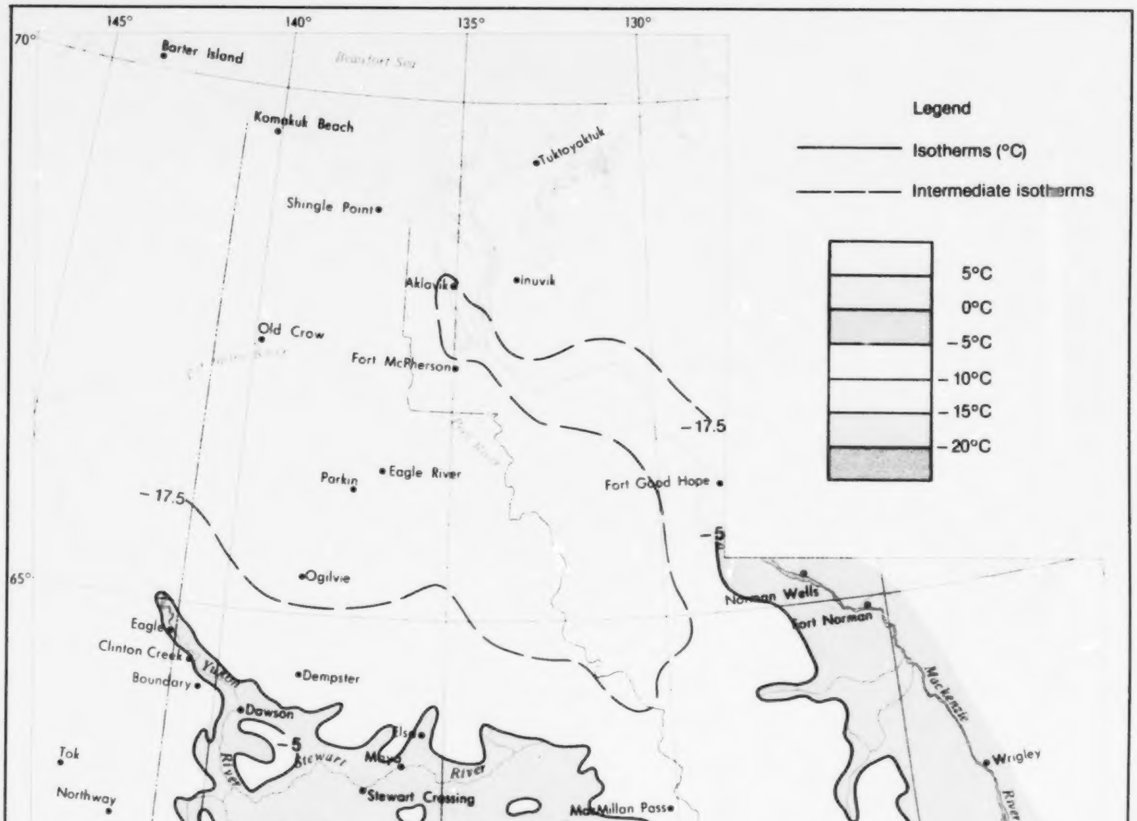

145°
140°
135°
130°
70°
65°
60°
125°
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Fort McPherson
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Yukon
Dempster
Dawson
Elsa
Mayo
Stewart River
Tok
Northway
Stewart Crossing
MacMillan Pass
Mackenzie River
Wrigley
Fort Selkirk
Pelly River
Sheldon Lake
Beaver Creek
Snag
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
Nahanni River
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Logan
Whitehorse
Johnsons Crossing
Yakataga
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Fort Liard
Liard River
Mile 75
Alsek River
Yakutat
Haines Apps. #2
Skagway
Haines
Atlin
Cassiar
Muncho Lake
Summit
Taku River
PACIFIC OCEAN
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
Stikine River
Kinaskan Lake
Ware
Angoon
Legend
Isotherms (°C)
Intermediate isotherms
5°C
0°C
-5°C
-10°C
-15°C
-20°C
-17.5
-5
-10
0
-15
5

Figure 8.17 October mean daily temperature

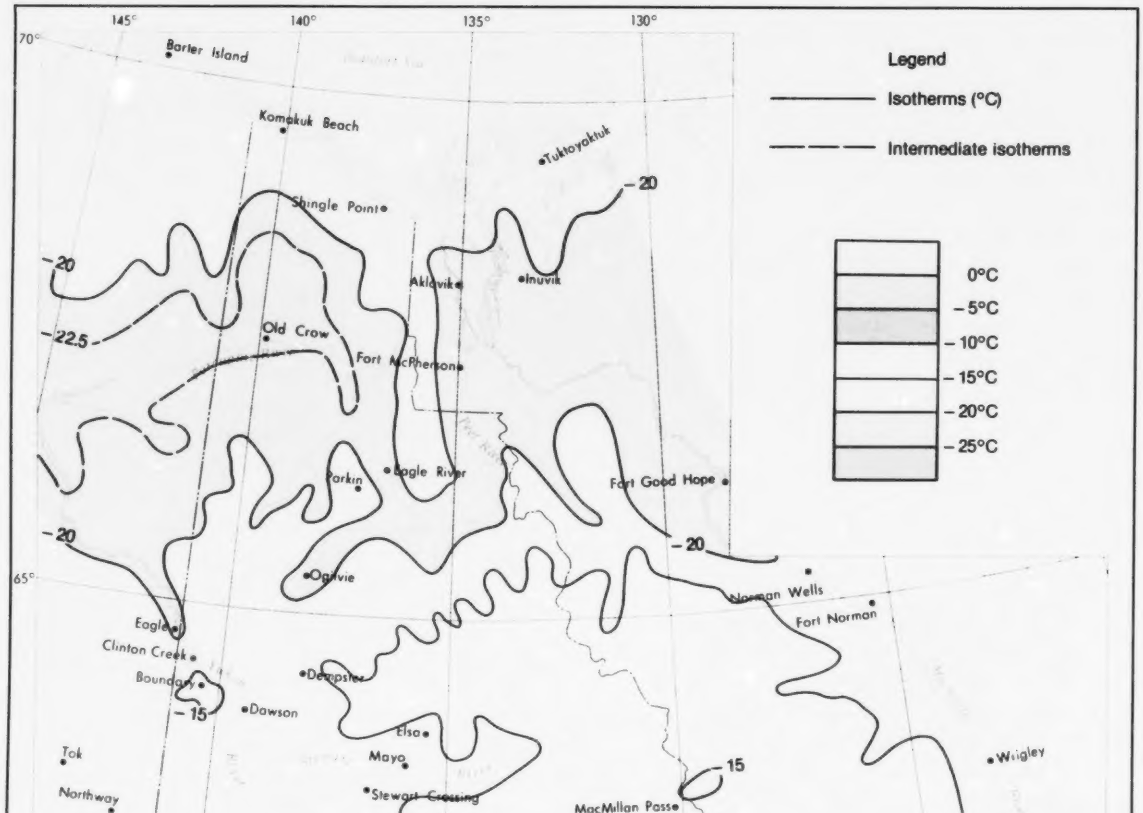

Legend
Isotherms (°C)
Intermediate isotherms
0°C
-5°C
-10°C
-15°C
-20°C
-25°C
145°
140°
135°
130°
125°
70°
65°
60°
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Fort McPherson
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Tok
Northway
Stewart Crossing
MacMillan Pass
Wrigley
Fort Selkirk
Beaver Creek
Snag
Sheldon Lake
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Lapans
Whitehorse
Johnsons Crossing
Fort Liard
Bakatago
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Mile 75
Yakutat
Haines Apps. #1
Skagway
Atlin
Haines
Cassiar
Muncho Lake
Summit
Dease Lake
Gustavus
Juneau
Taku River
PACIFIC OCEAN
Cape Spencer
Telegraph Creek
River
Stikine
Kinaskan Lake
Ware
Angoon
-20
-22.5
-15
-25
-10
-5
0

Figure 8.18 November mean daily temperature

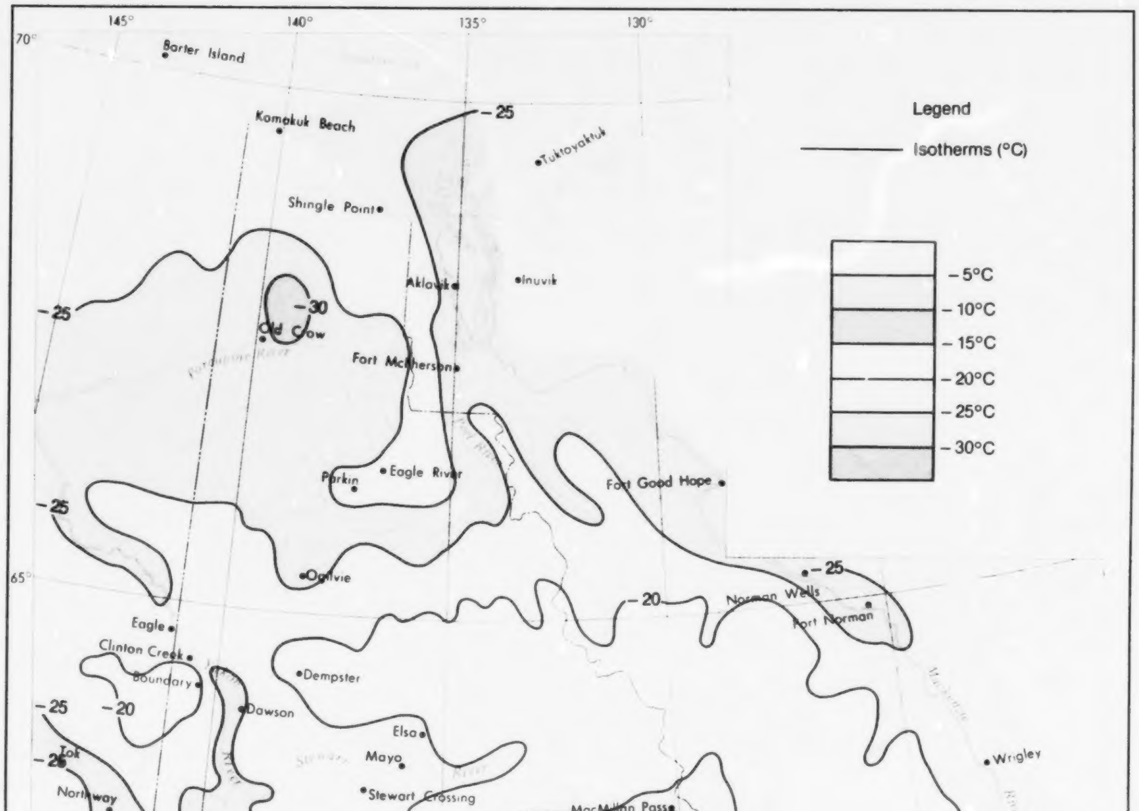

Legend
Isotherms (°C)
- 5°C
- 10°C
- 15°C
- 20°C
- 25°C
- 30°C
145°
140°
135°
130°
125°
70°
65°
60°
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Fort McPherson
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Stewart Crossing
Wrigley
Tok
Northway
MacMillan Pass
Fort Selkirk
Sheldon Lake
Anvil
Faro
Beaver Creek
Snag
Drury Creek
Carmacks
Ross River
Tungsten
Aishihik
Burwash
Kluane
Haines Junction
Divide
Logan
Quiet Lake
Tuchitua
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Mile 75
Haines Apps. #2
Skagway
Atlin
Yakutat
Haines
Cassiar
Muncho Lake
Summit
Dease Lake
Gustavus
Juneau
PACIFIC OCEAN
Cape Spencer
Telegraph Creek
Ware
Kinaskan Lake
Angoon
Stewart River
Pelly River
Taku River
Stikine River
- 25
- 30
- 20
- 15
- 10
- 5

Figure 8.19 December mean daily temperature

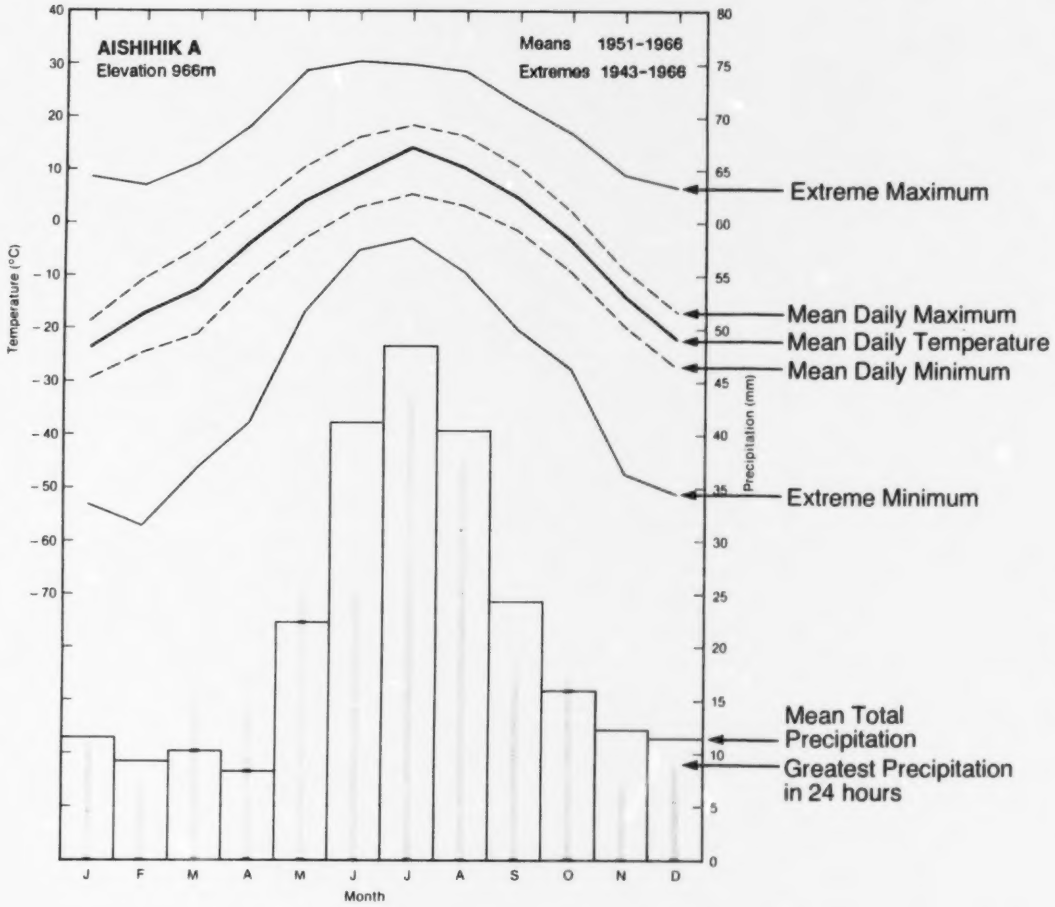


Figure 8.20 Temperature and precipitation means and extremes

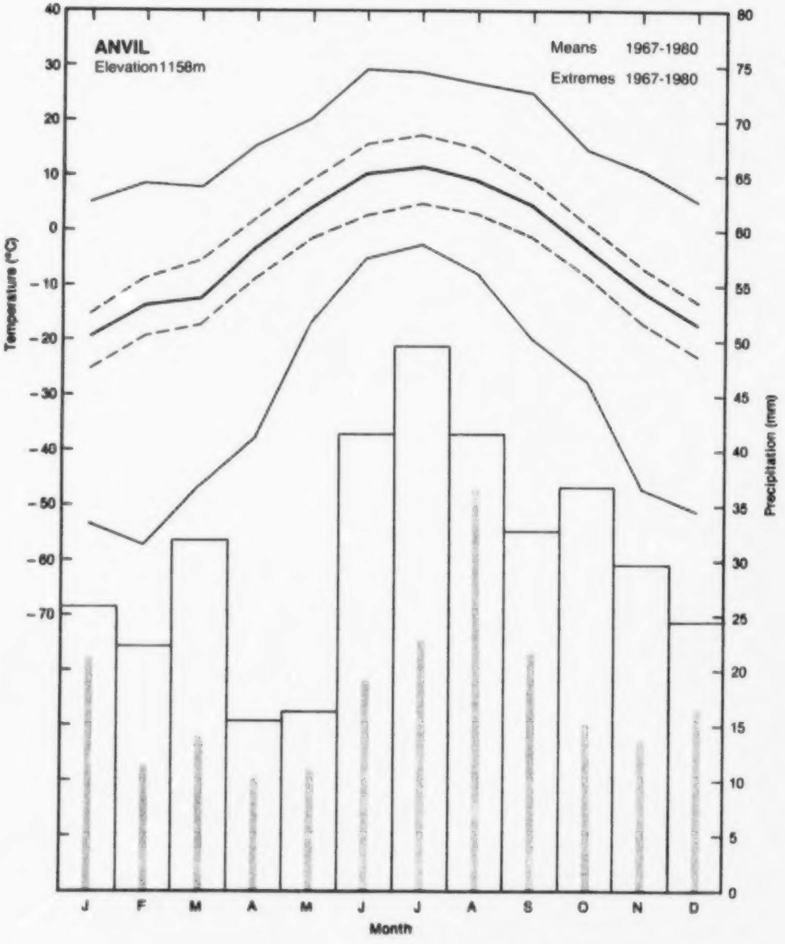


Figure 8.21 Temperature and precipitation means and extremes

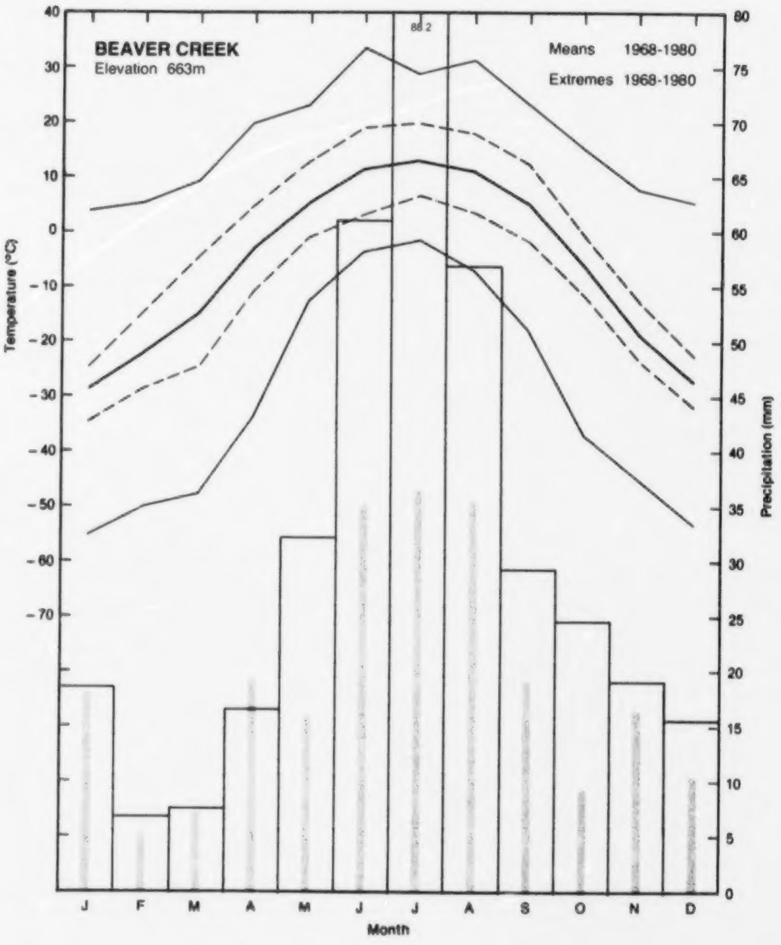


Figure 8.22 Temperature and precipitation means and extremes

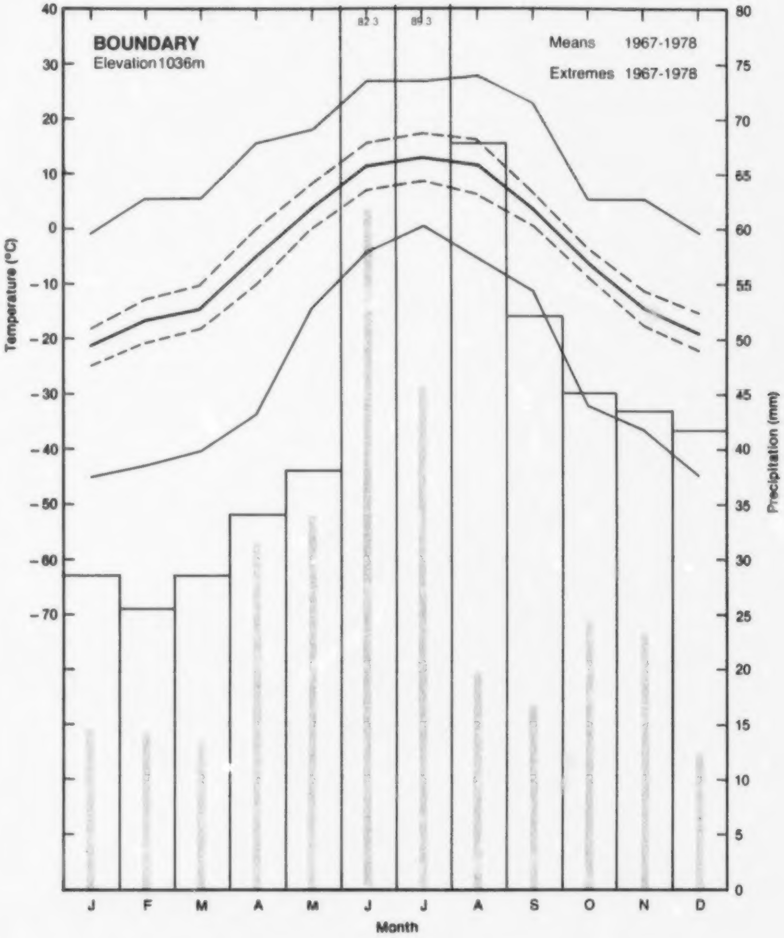


Figure 8.23 Temperature and precipitation means and extremes

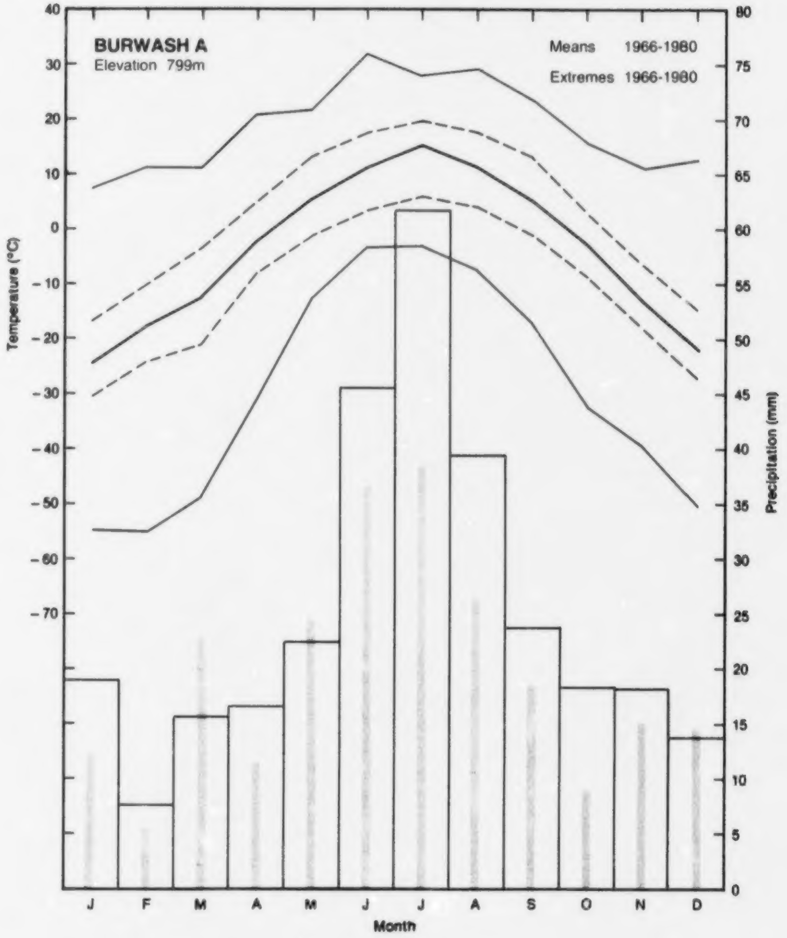


Figure 8.24 Temperature and precipitation means and extremes

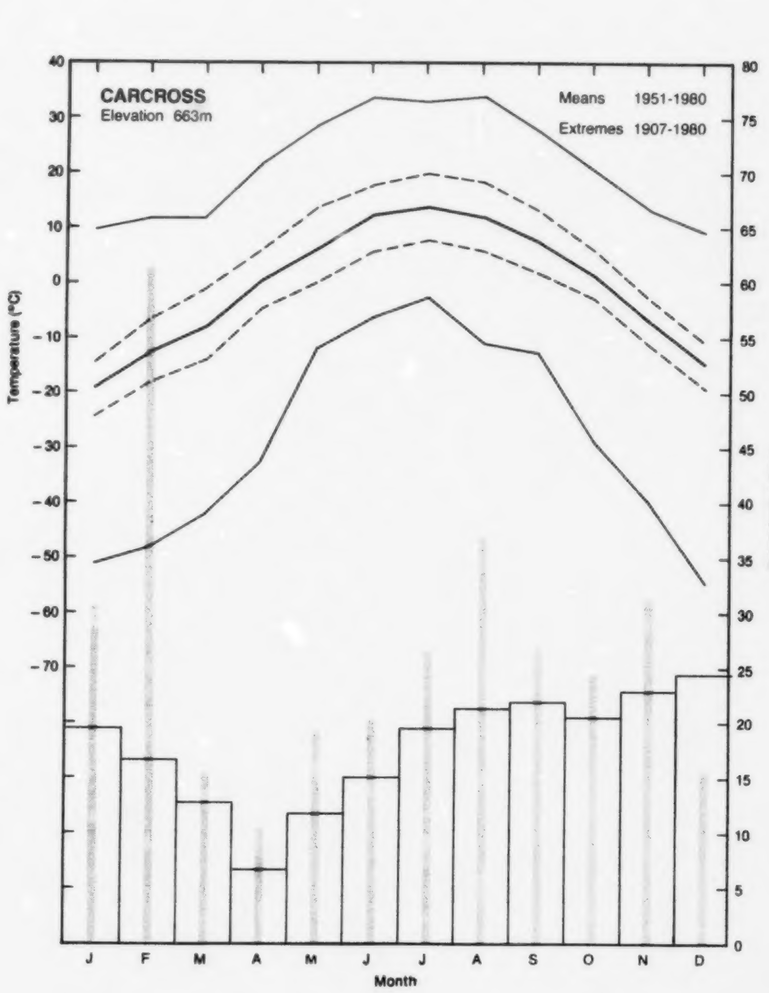


Figure 8.25 Temperature and precipitation means and extremes

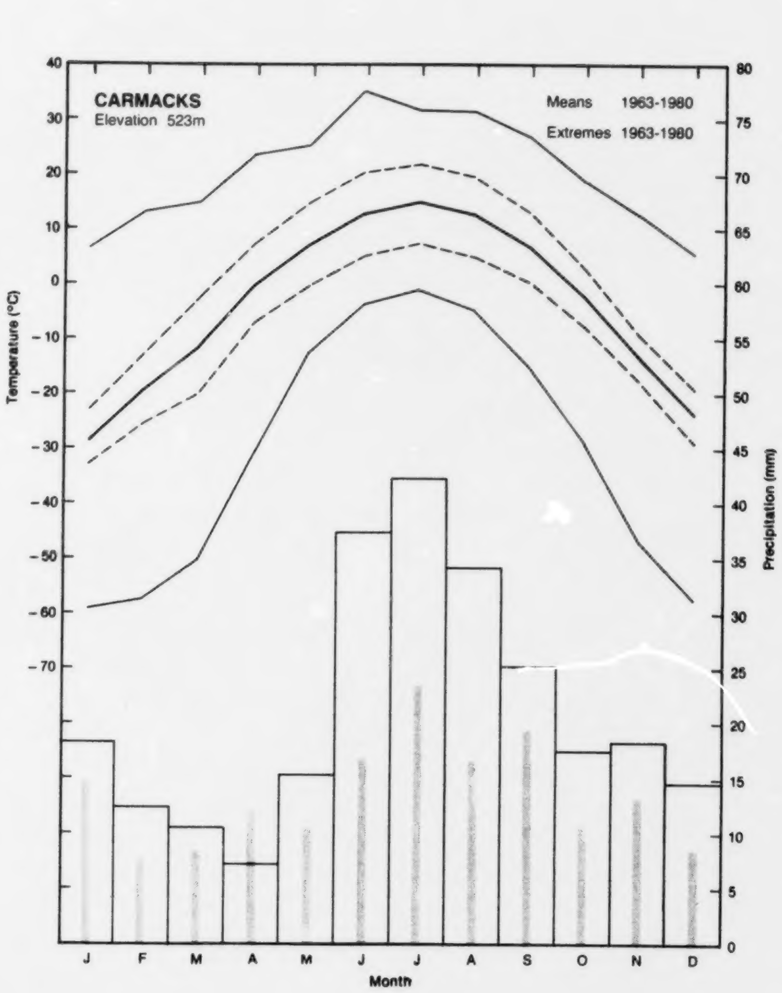


Figure 8.26 Temperature and precipitation means and extremes

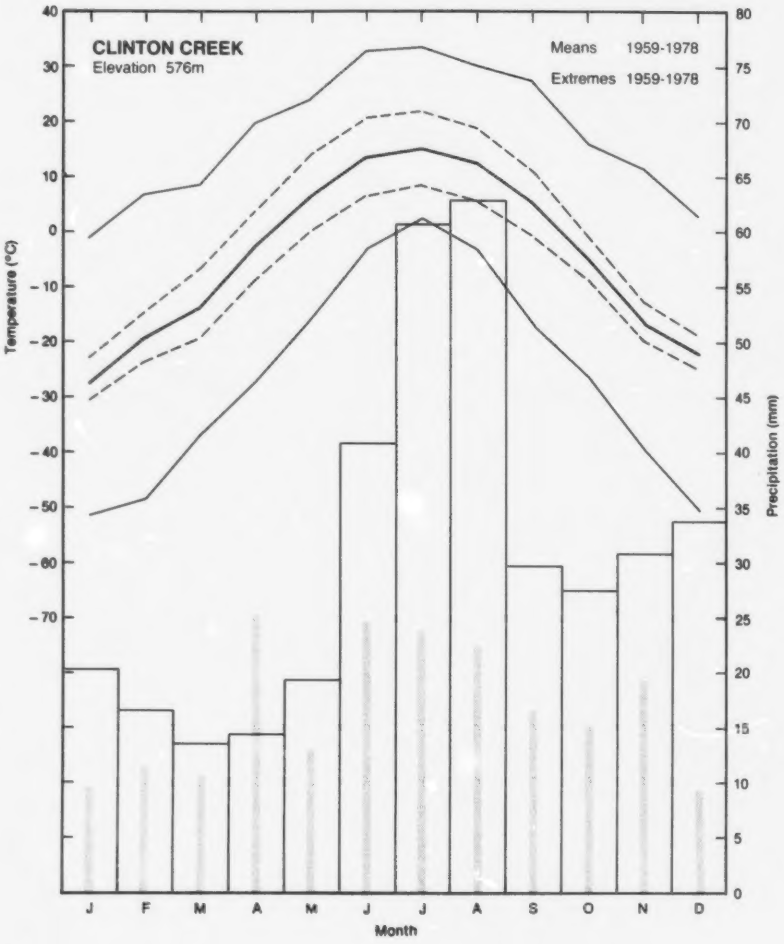


Figure 8.27 Temperature and precipitation means and extremes

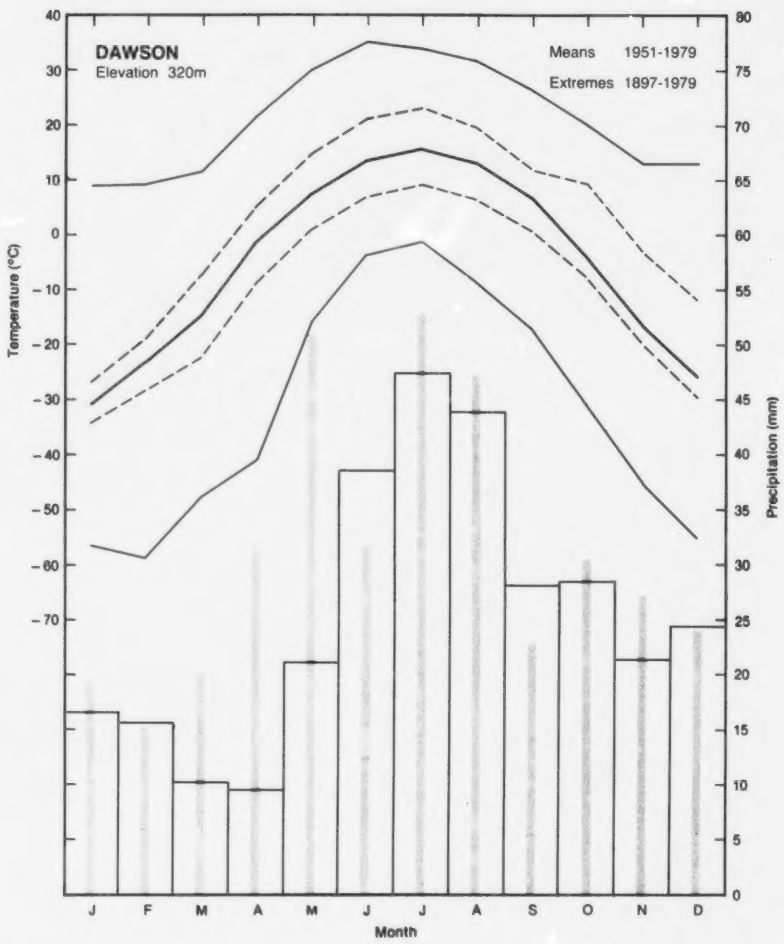


Figure 8.28 Temperature and precipitation means and extremes

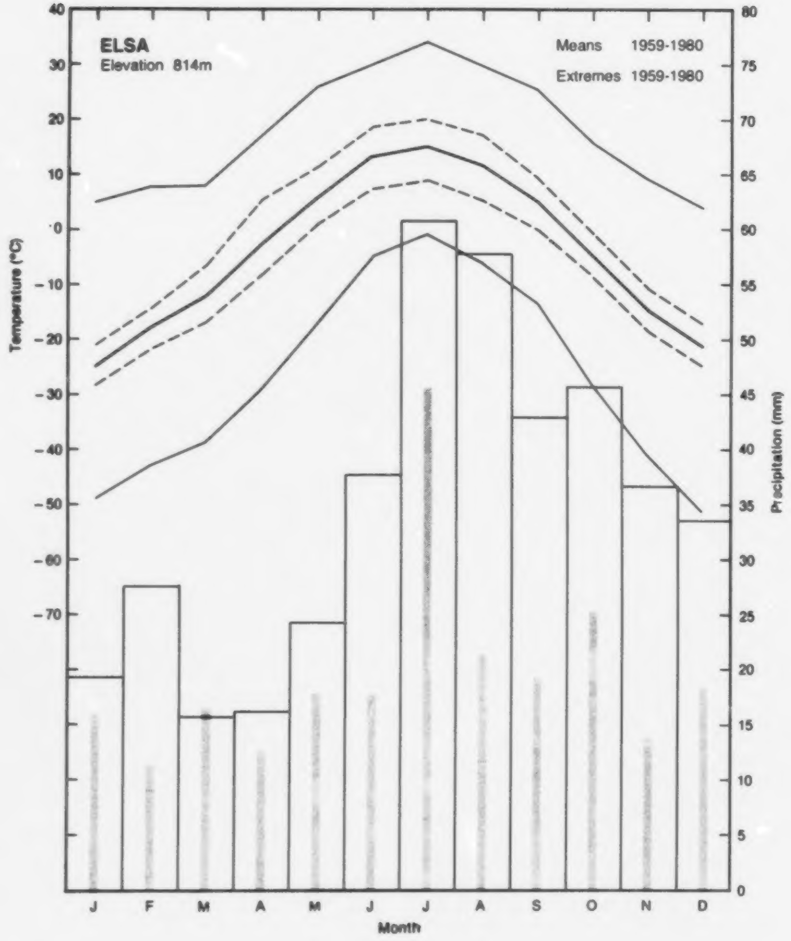


Figure 8.29 Temperature and precipitation means and extremes

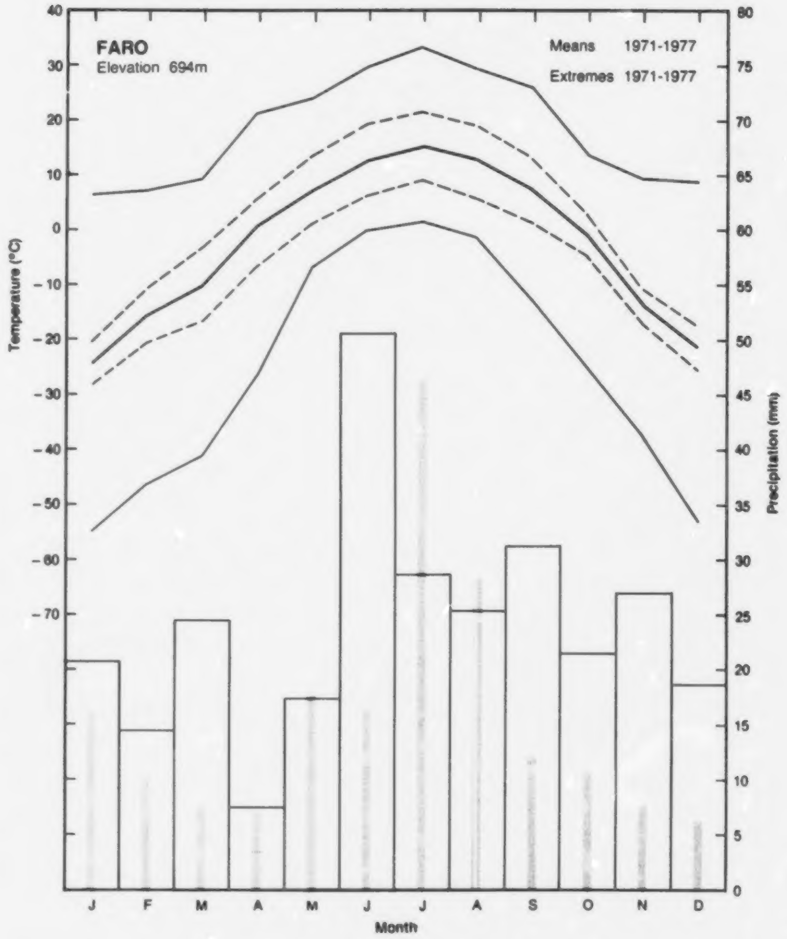


Figure 8.30 Temperature and precipitation means and extremes

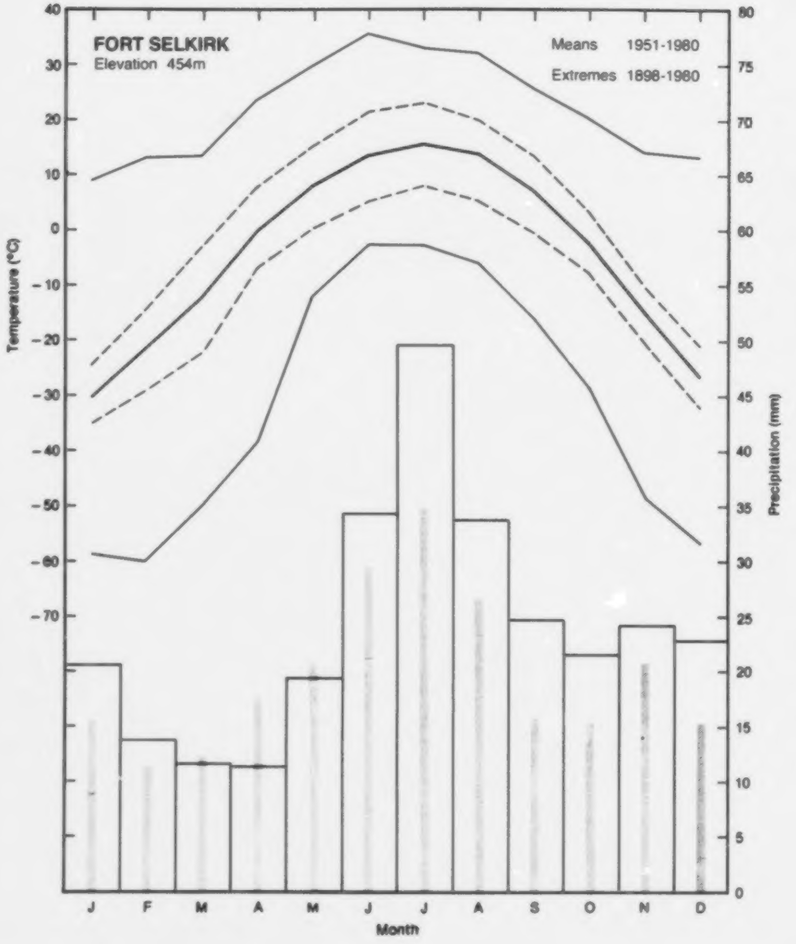


Figure 8.31 Temperature and precipitation means and extremes

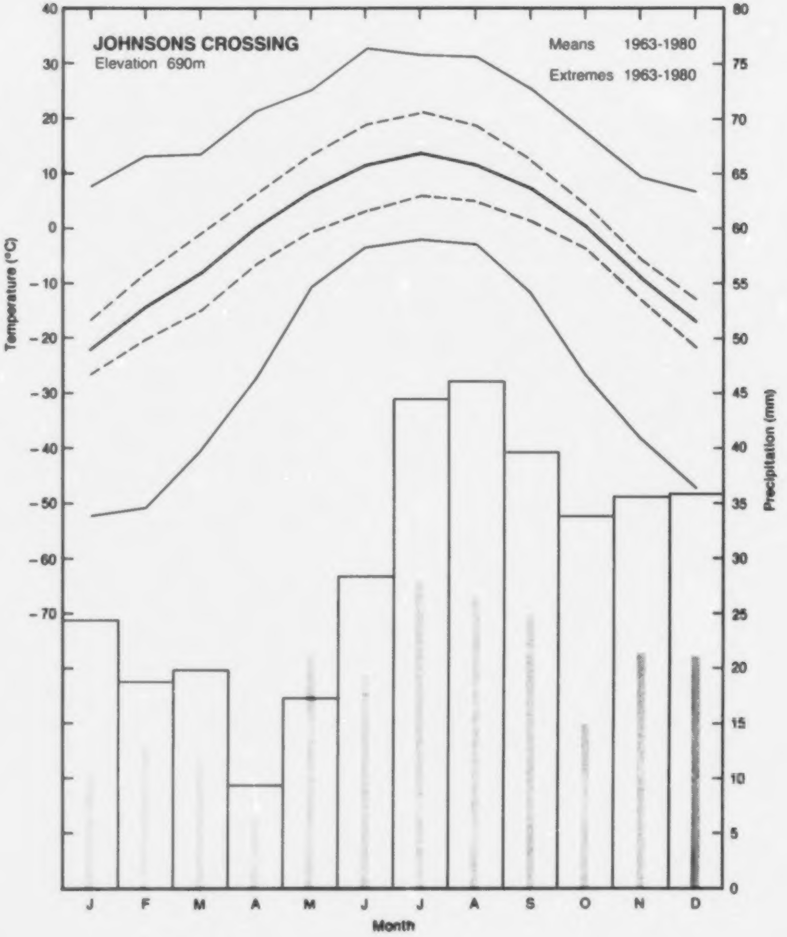


Figure 8.32 Temperature and precipitation means and extremes

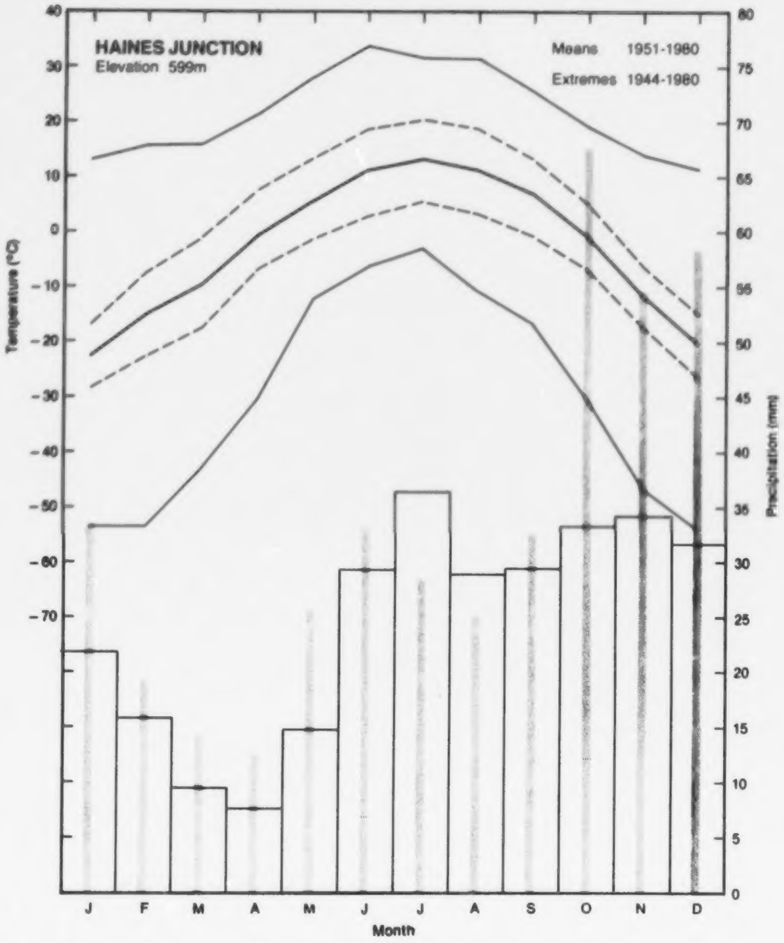


Figure 8.33 Temperature and precipitation means and extremes

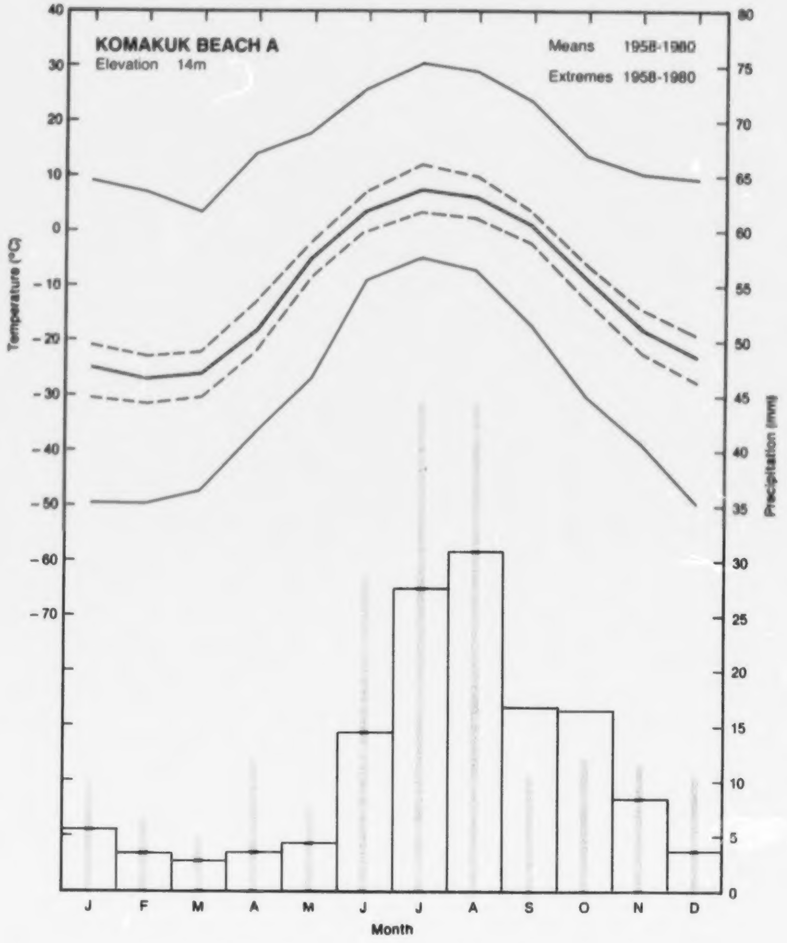


Figure 8.34 Temperature and precipitation means and extremes

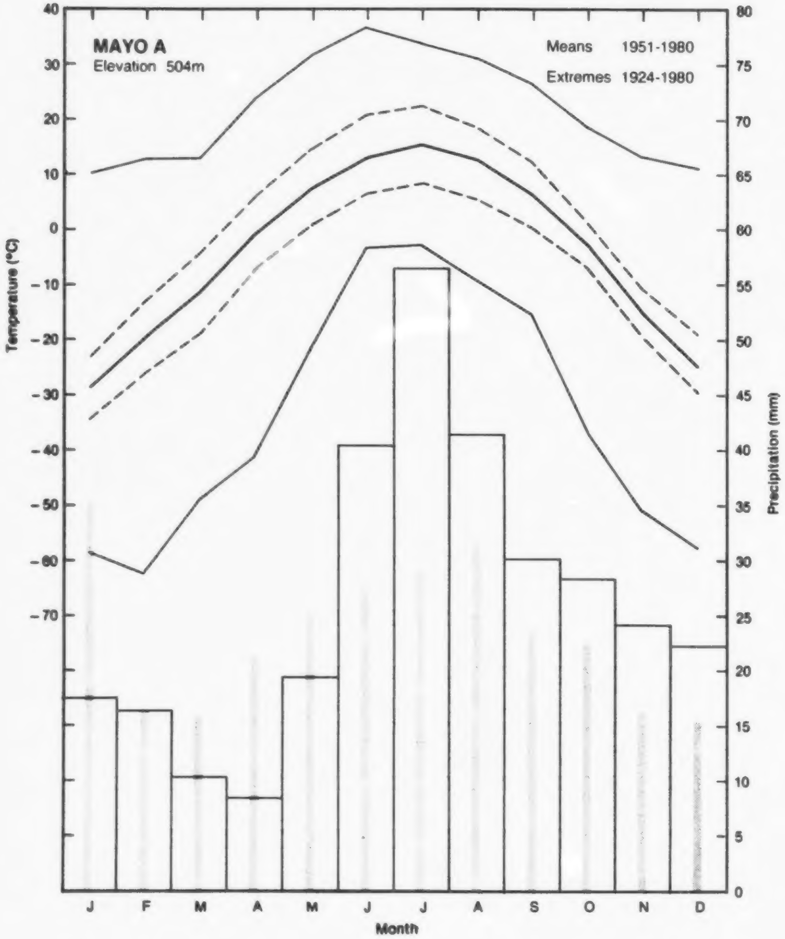


Figure 8.35 Temperature and precipitation means and extremes

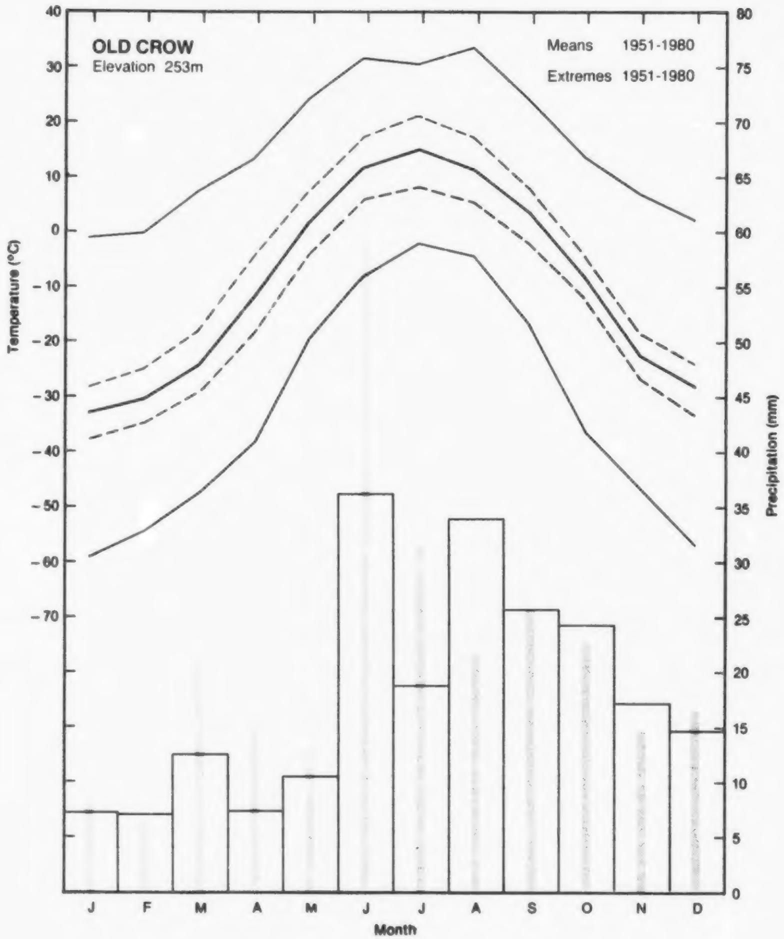


Figure 8.36 Temperature and precipitation means and extremes

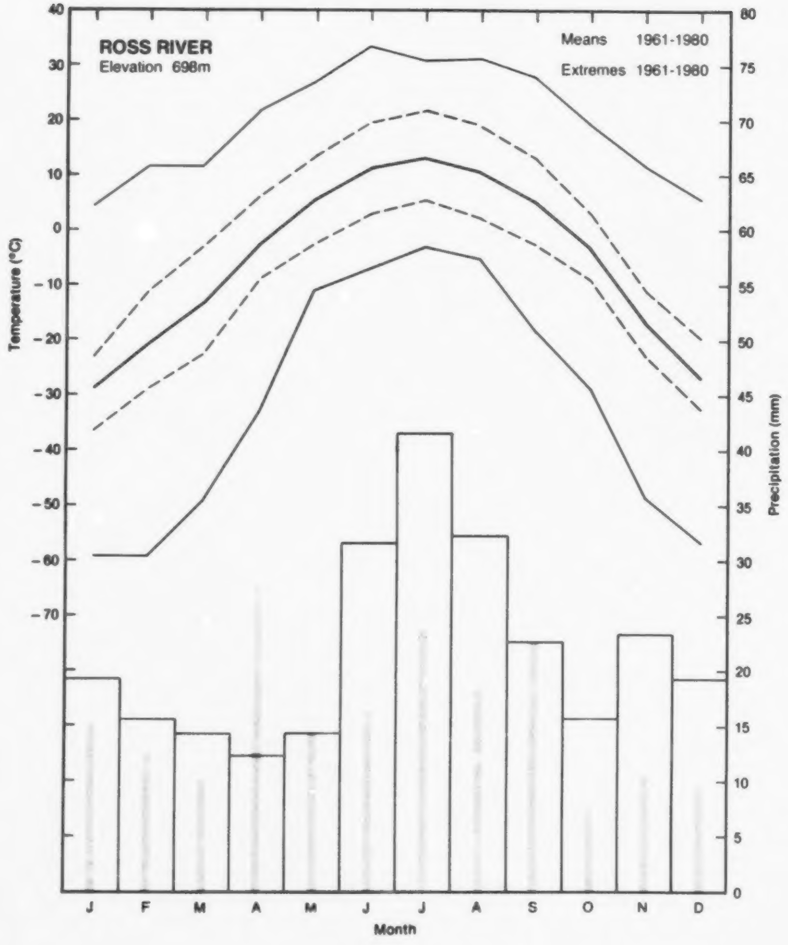


Figure 8.37 Temperature and precipitation means and extremes

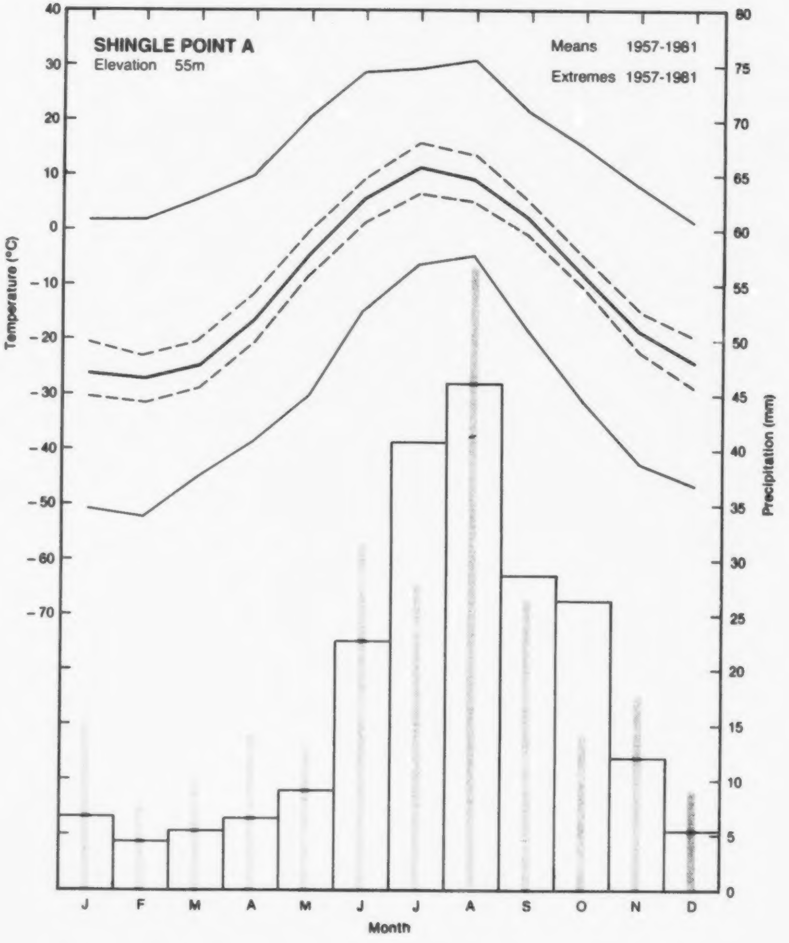


Figure 8.38 Temperature and precipitation means and extremes

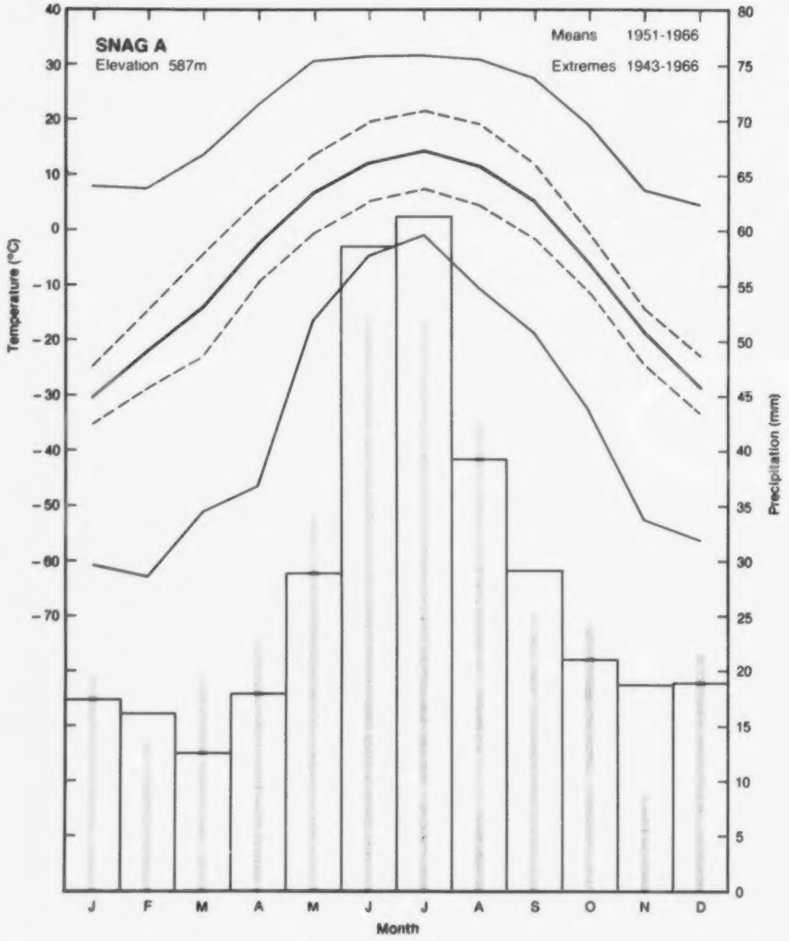


Figure 8.39 Temperature and precipitation means and extremes

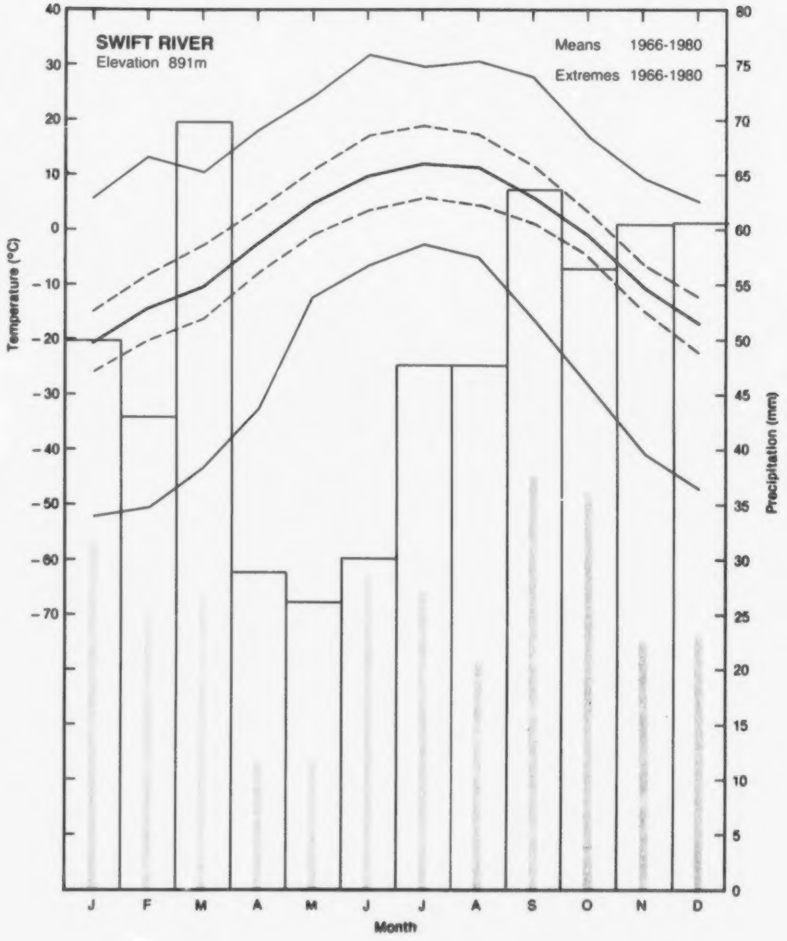


Figure 8.40 Temperature and precipitation means and extremes

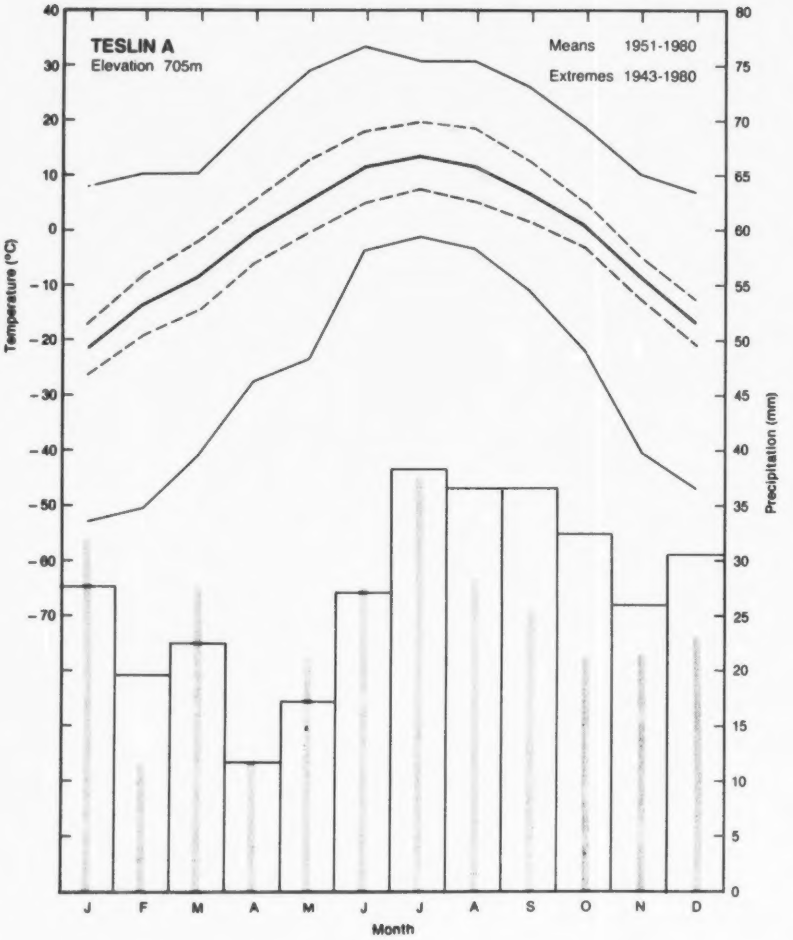


Figure 8.41 Temperature and precipitation means and extremes

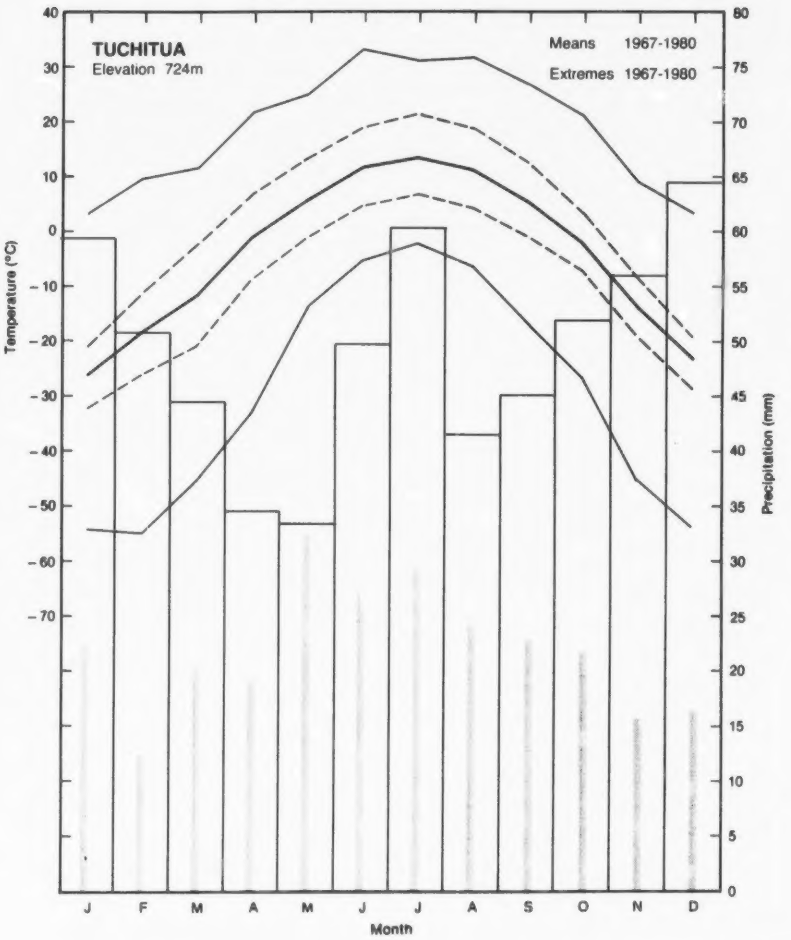


Figure 8.42 Temperature and precipitation means and extremes

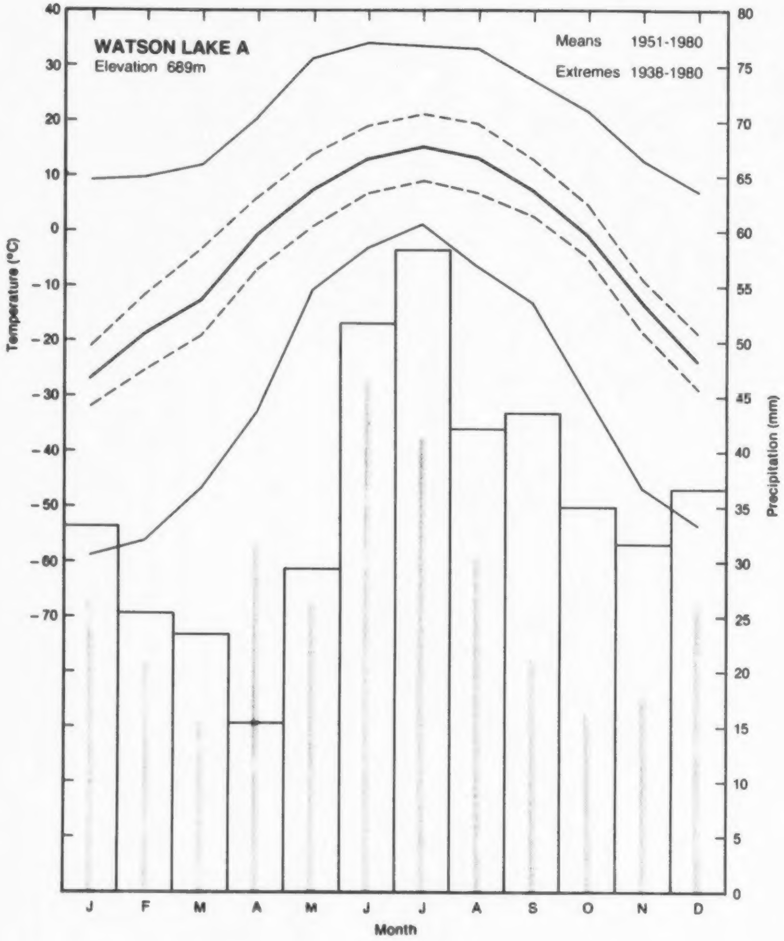


Figure 8.43 Temperature and precipitation means and extremes

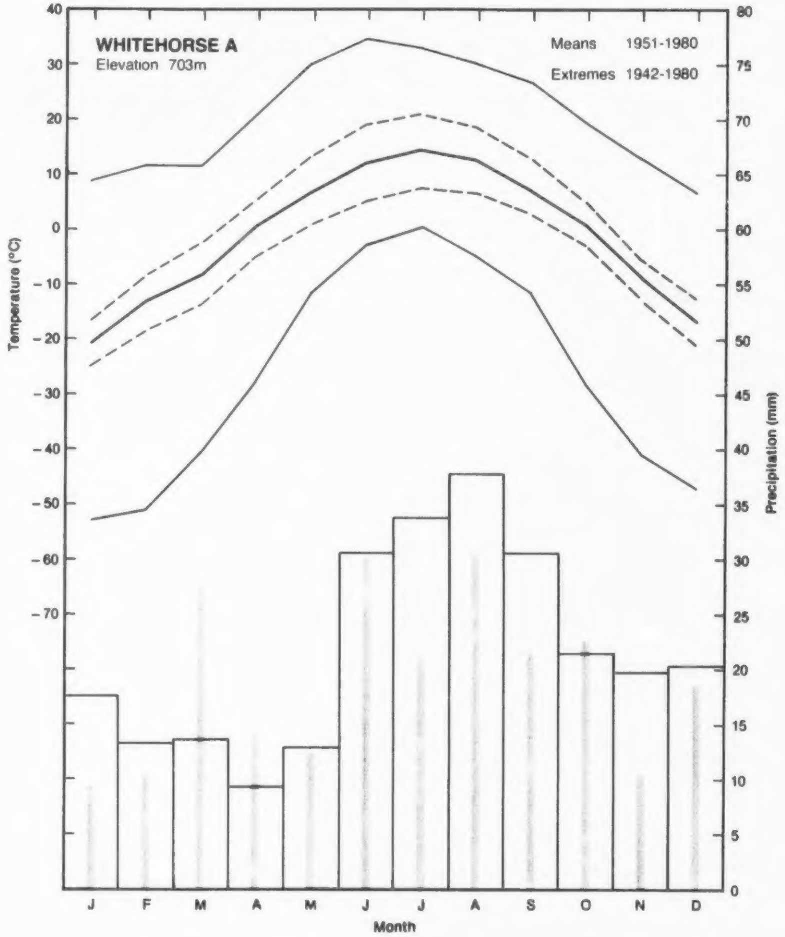


Figure 8.44 Temperature and precipitation means and extremes

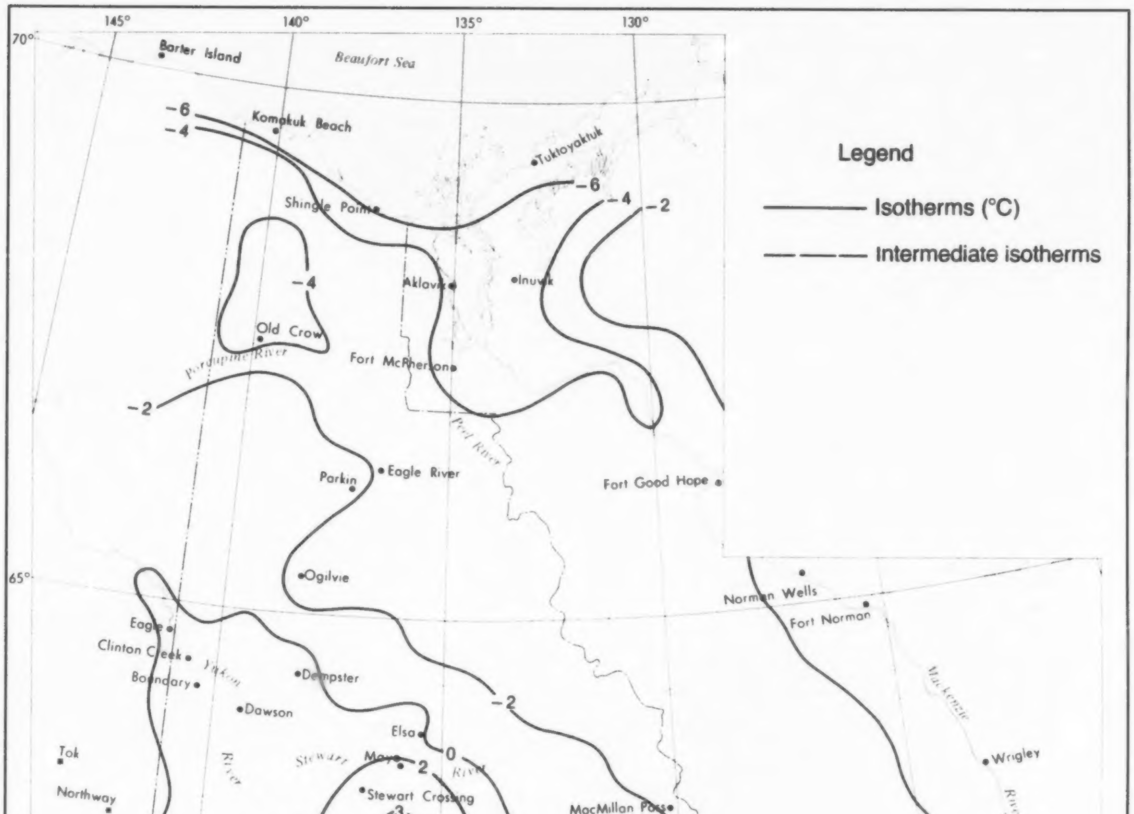

Legend
Isotherms (°C)
Intermediate isotherms
145°
140°
135°
130°
125°
70°
65°
60°
Beaufort Sea
PACIFIC OCEAN
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Mackenzie River
Eagle
Clinton Creek
Boundary
Yukon River
Dempster
Dawson
Elsa
Mayo
Stewart River
Stewart Crossing
Tok
Northway
Wrigley
MacMillan Pass
Fort Selkirk
Pelly River
Beaver Creek
Snag
Sheldon Lake
Anvil
Faro
Carmacks
Drury Creek
Ross River
Tungsten
South Nahanni River
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Logan
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Teslin
Swift River
Watson Lake
Carcross
Lower Post
Smith River
Liard River
Mile 75
Haines Apts #2
Skagway
Atlin
Cassiar
Muncho Lake
Yakutat
Haines
Summit
Taku River
Dease Lake
Gustavus
Juneau
Cape Spencer
Telegraph Creek
Stikine River
Ware
Kinaskan Lake
Angoon
−6
−4
−2
0
1
2
3
4

Figure 8.45 Annual mean daily maximum temperature

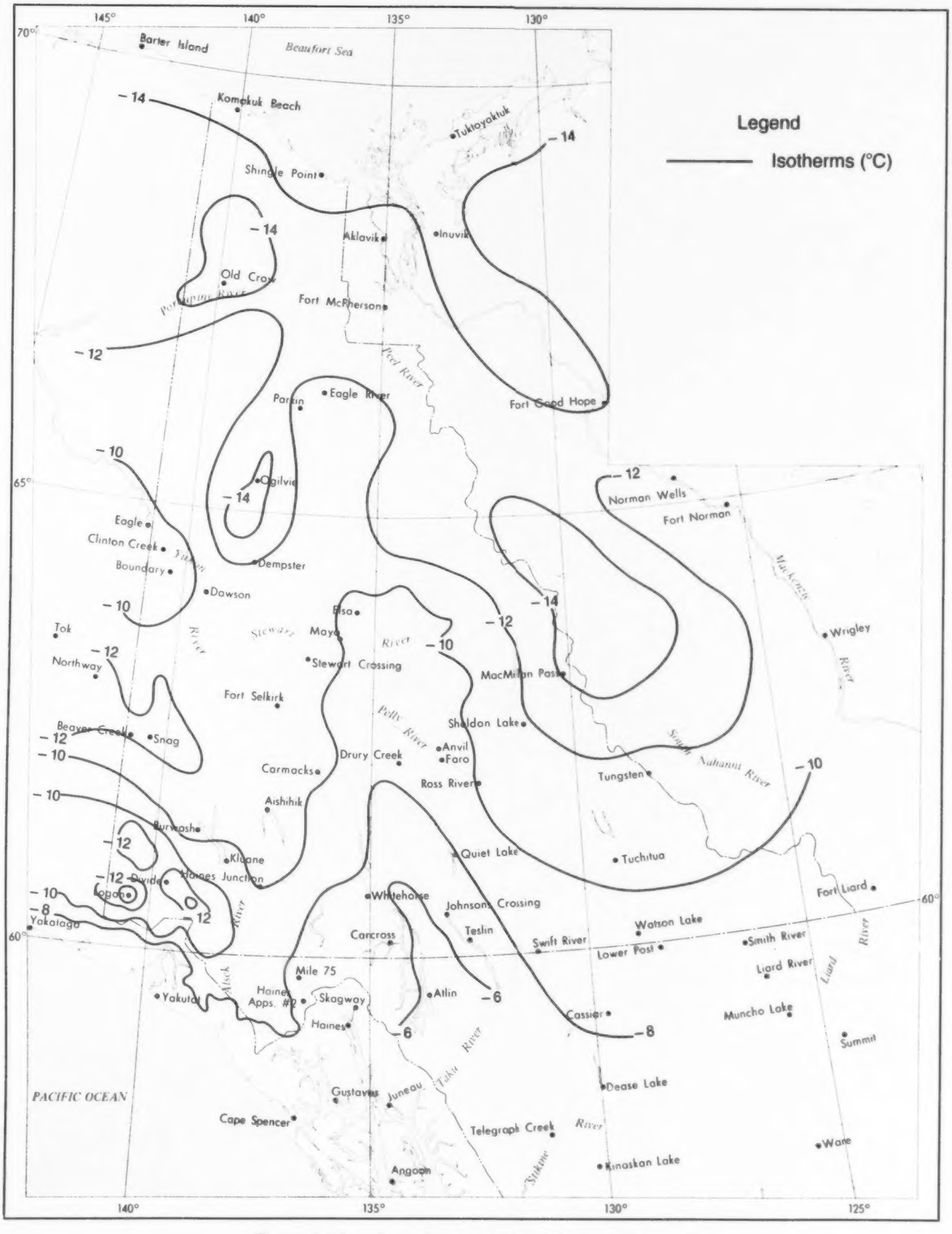

145°
140°
135°
130°
70°
65°
60°
125°
Legend
Isotherms (°C)
Beaufort Sea
PACIFIC OCEAN
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Fort Good Hope
Parkin
Eagle River
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Yukon
Boundary
Dempster
Dawson
Mackenzie
Tok
Elsa
Mayo
Stewart River
Northway
Stewart Crossing
MacMillan Pass
Wrigley
River
Fort Selkirk
Pelly River
Sheldon Lake
South Nahanni River
Beaver Creek
Snag
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Logan
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Alsek River
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Liard River
Mile 75
Haines Apps. #2
Skagway
Atlin
Yakutat
Haines
Cassiar
Muncho Lake
Summit
Taku River
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
River
Stikine
Ware
Angoon
Kinaskan Lake
– 14
– 14
– 14
– 14
– 14
– 12
– 12
– 12
– 12
– 12
– 12
– 12
– 12
– 10
– 10
– 10
– 10
– 10
– 10
– 8
– 8
– 6
– 6

Figure 8.46 Annual mean daily minimum temperature

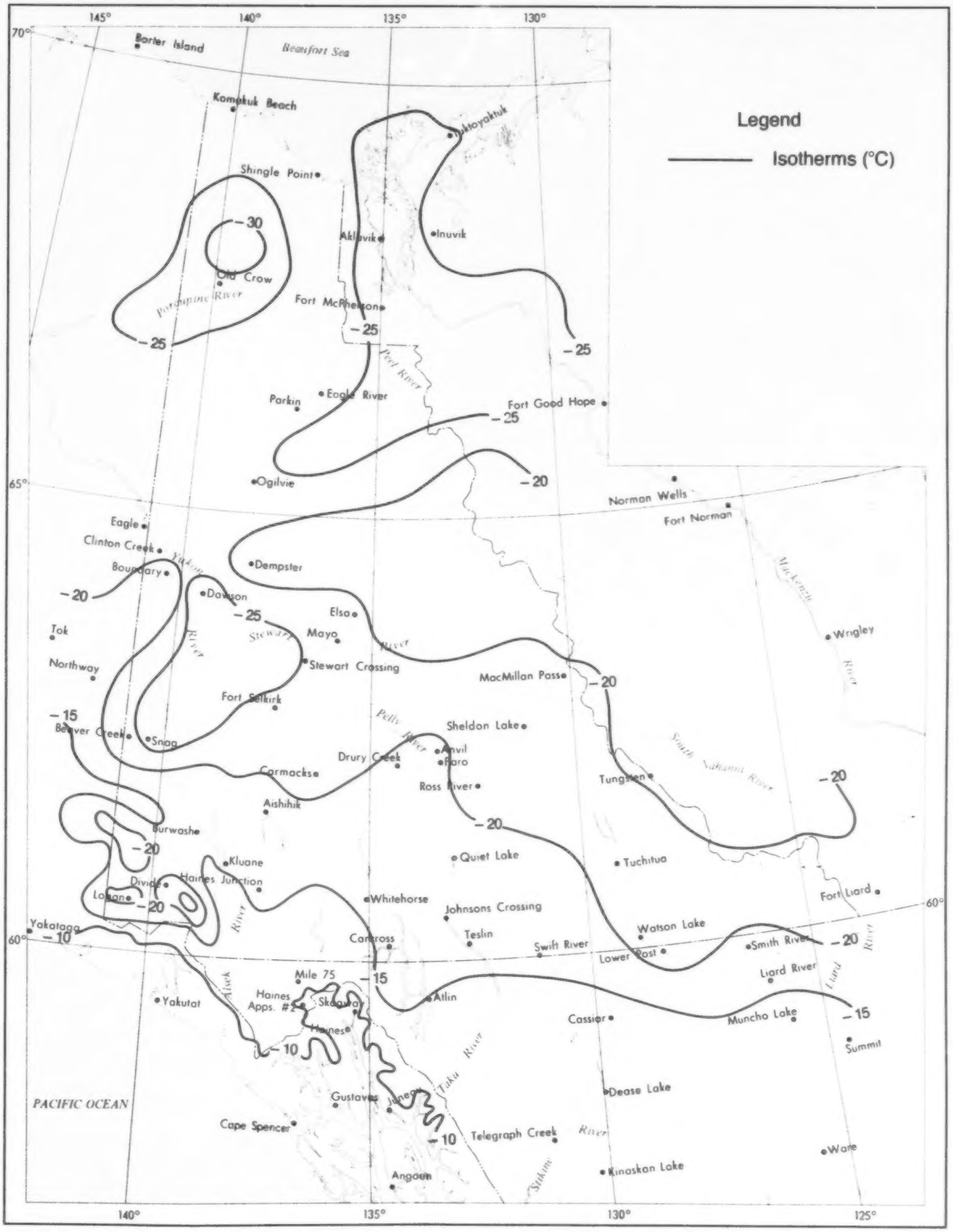

Legend
Isotherms (°C)
145°
140°
135°
130°
125°
70°
65°
60°
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
Shingle Point
−30
Old Crow
Porcupine River
Aklavik
Inuvik
Fort McPherson
−25
Peel River
Parkin
Eagle River
Fort Good Hope
−20
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Yukon River
Dempster
Dawson
Elsa
Mayo
Stewart River
Stewart Crossing
Tok
Northway
Wrigley
Mackenzie River
MacMillan Pass
Fort Selkirk
Pelly River
Sheldon Lake
−15
Beaver Creek
Snag
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
South Nahanni River
Aishihik
Burwashe
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Whitehorse
Logan
Johnsons Crossing
Fort Liard
Yakataga
−10
Alsek River
Teslin
Carcross
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Mile 75
Yakutat
Haines Apps. #2
Skagway
Atlin
Cassiar
Muncho Lake
Haines
Taku River
Summit
Dease Lake
PACIFIC OCEAN
Gustavus
Juneau
Cape Spencer
Telegraph Creek
Stikine River
Ware
Angoon
Kinaskan Lake

Figure 8.47 January mean daily maximum temperature

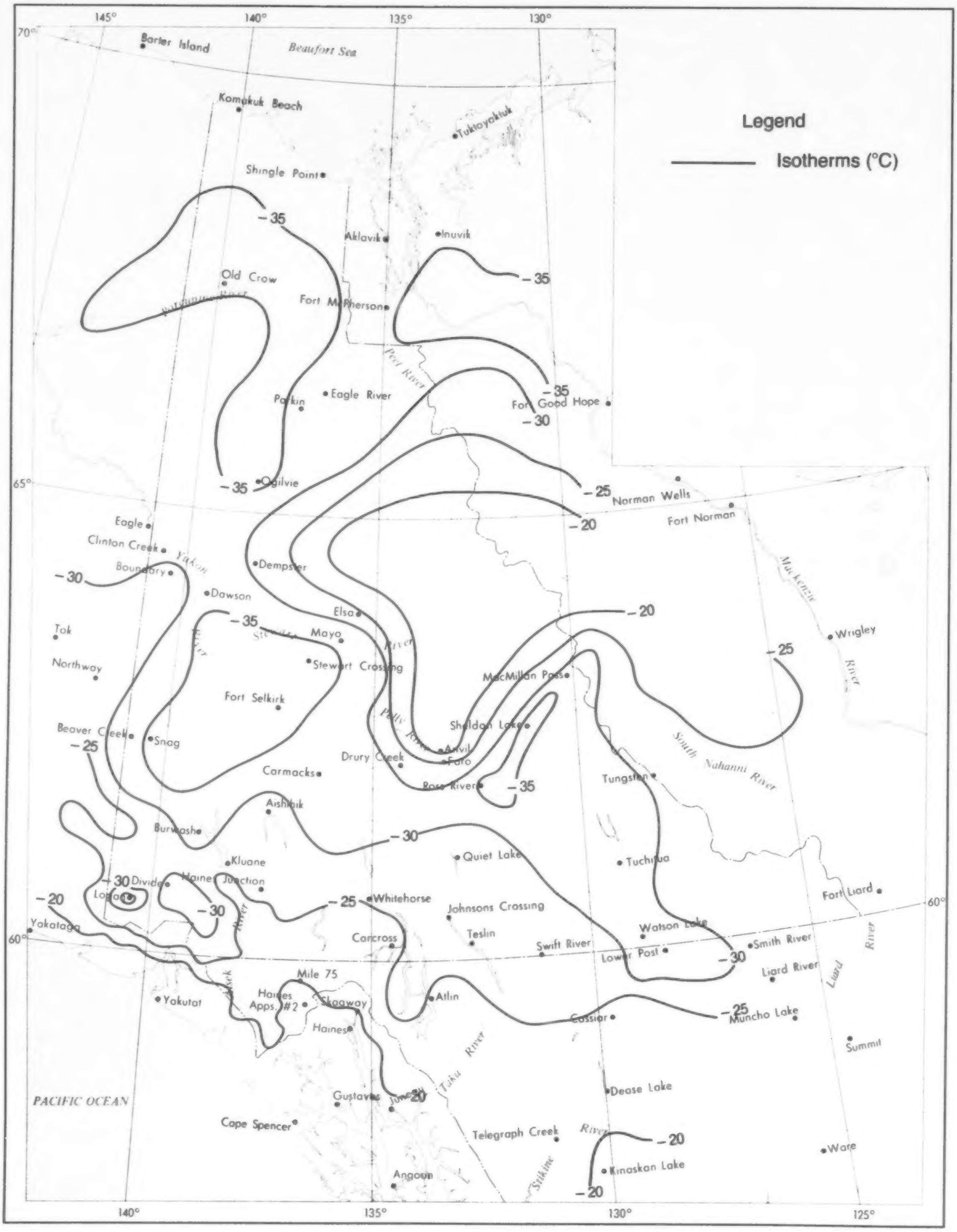

Legend
Isotherms (°C)
145°
140°
135°
130°
125°
70°
65°
60°
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Yukon
Boundary
Dawson
Dempster
Elsa
Mayo
Stewart
Stewart Crossing
Tok
Northway
Fort Selkirk
White River
Wrigley
Mackenzie
River
MacMillan Pass
Pelly River
Sheldon Lake
Anvil
Faro
Ross River
Drury Creek
Carmacks
Beaver Creek
Snag
Tungsten
South Nahanni River
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Whitehorse
Johnsons Crossing
Teslin
Logan
Yakataga
Carcross
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Liard
Alsek River
Mile 75
Haines Apps. #2
Skagway
Haines
Yakutat
Atlin
Cassiar
Muncho Lake
Summit
Taku River
Gustavus
Juneau
Dease Lake
PACIFIC OCEAN
Cape Spencer
Telegraph Creek
Stikine
Kinaskan Lake
Ware
Angoon
-35
-30
-25
-20

Figure 8.48 January mean daily minimum temperature

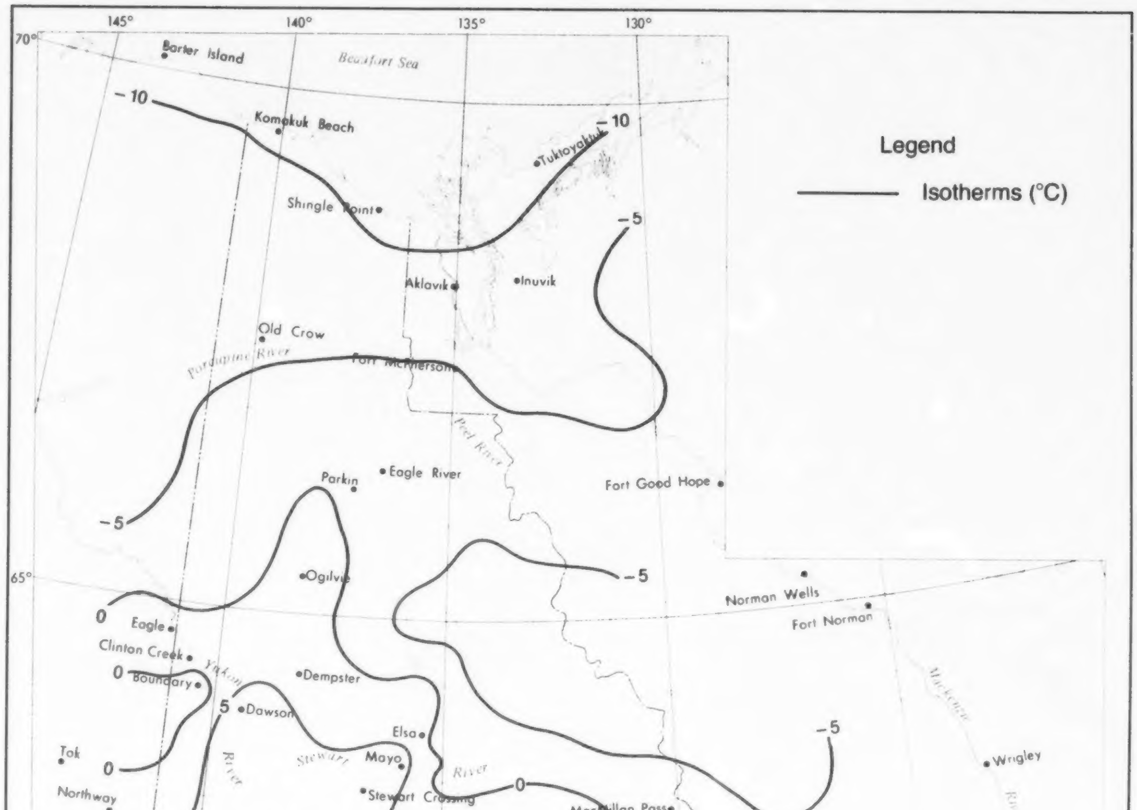

Legend
Isotherms (°C)
145°
140°
135°
130°
125°
70°
65°
60°
Beaufort Sea
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Yukon River
Dempster
Dawson
Tok
Northway
Elsa
Mayo
Stewart River
Stewart Crossing
Mackenzie River
Wrigley
Fort Selkirk
MacMillan Pass
Sheldon Lake
Pelly River
South Nahanni River
Beaver Creek
Snag
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Logan
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Teslin
Watson Lake
Carcross
Swift River
Lower Post
Smith River
Mile 75
Liard River
Haines Apps. #2
Skagway
Atlin
Yakutat
Haines
Cassiar
Muncho Lake
Summit
Taku River
PACIFIC OCEAN
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
Stikine River
Ware
Angoon
Kinaskan Lake
-10
-10
-5
-5
-5
-5
0
0
0
0
0
0
0
-5
-5
5
5
5
5
5
5
5
10
10
10
10

Figure 8.49 April mean daily maximum temperature

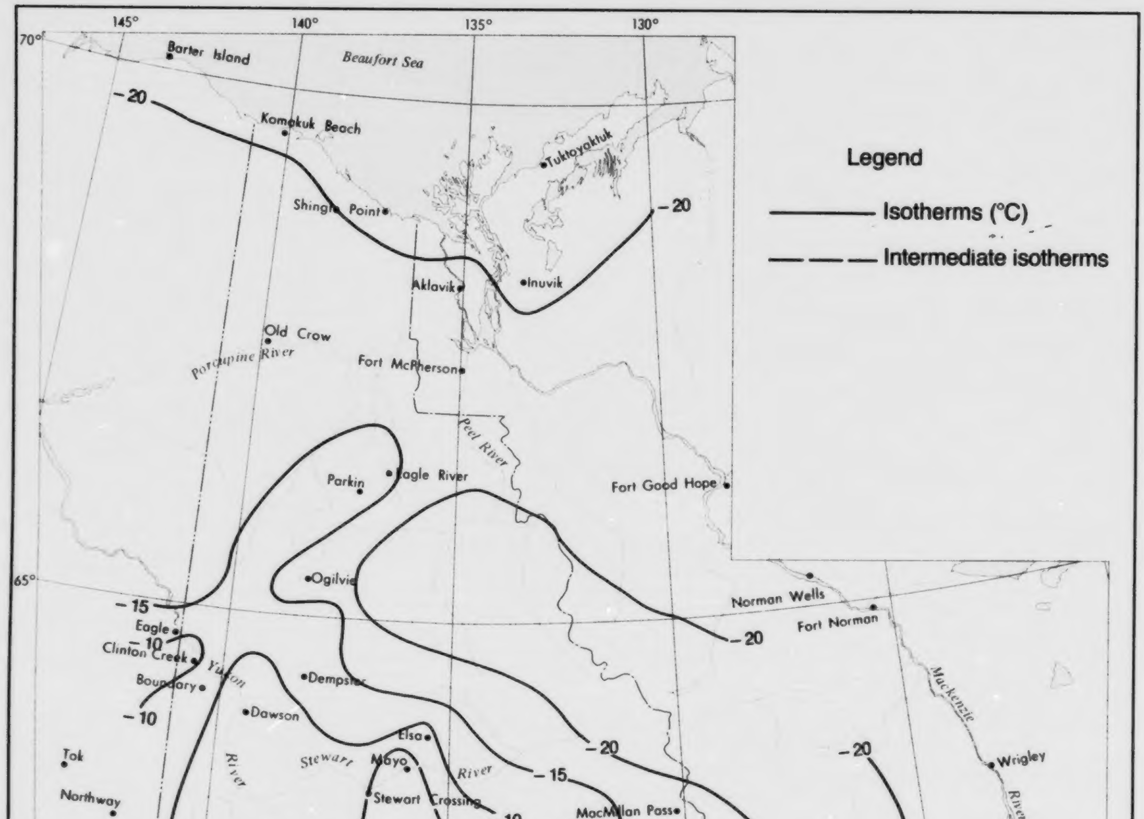

145°
140°
135°
130°
70°
65°
60°
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Fort Good Hope
Parkin
Eagle River
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Yukon
Dempster
Dawson
Elsa
Mayo
Stewart River
Stewart Crossing
Mackenzie
Wrigley
River
Tok
Northway
Fort Selkirk
MacMillan Pass
Pelly River
Sheldon Lake
South Nahanni River
Beaver Creek
Snag
Drury Creek
Anvil
Faro
Carmacks
Ross River
Tungsten
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Logan
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Alsek River
Carcross
Teslin
Watson Lake
Swift River
Lower Post
Smith River
Liard River
Liard
Mile 75
Haines Apps. #2
Skagway
Atlin
Yakutat
Haines
Cassiar
Muncho Lake
Summit
Taku River
PACIFIC OCEAN
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
Stikine River
Kinaskan Lake
Ware
Angoon
-20
-15
-10
-7.5
-5
Legend
Isotherms (°C)
Intermediate isotherms

Figure 8.50 April mean daily minimum temperature

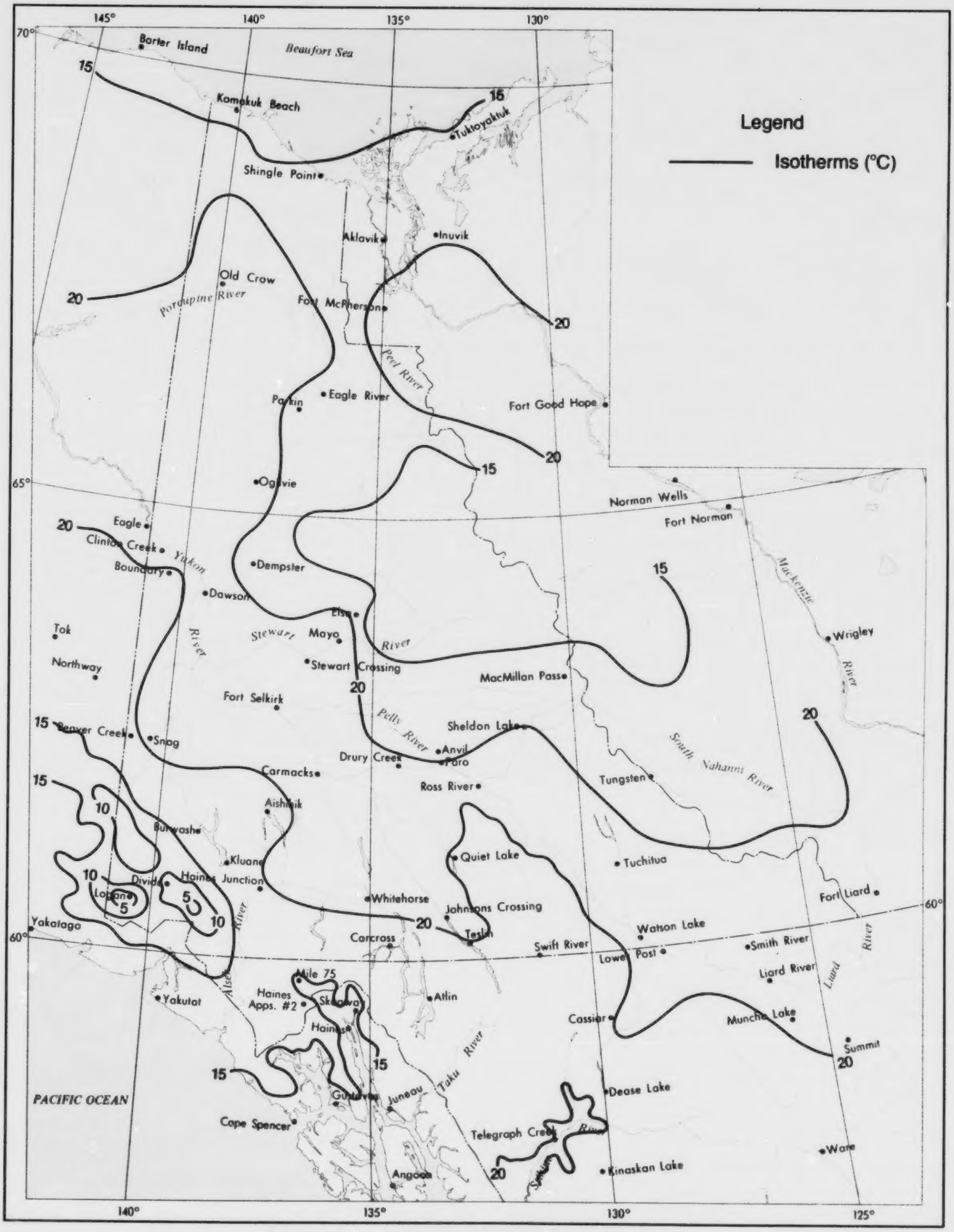

145°
140°
135°
130°
70°
Barter Island
Beaufort Sea
15
Komakuk Beach
15
Tuktoyaktuk
Legend
Isotherms (°C)
Shingle Point
Aklavik
Inuvik
Old Crow
20
Porcupine River
Fort McPherson
20
Peel River
Eagle River
Parkin
Fort Good Hope
20
15
65°
Ogilvie
Norman Wells
Fort Norman
20
Eagle
Clinton Creek
Yukon River
Boundary
Dempster
15
Mackenzie River
Dawson
Elsa
Tok
Mayo
Stewart River
Wrigley
Northway
Stewart Crossing
MacMillan Pass
20
Fort Selkirk
Pelly River
20
15
Beaver Creek
Snag
Sheldon Lake
Anvil
Faro
Drury Creek
South Nahanni River
Carmacks
Tungsten
Ross River
15
Aishihik
10
Burwash
Quiet Lake
Tuchitua
Kluane
10
Divide
Haines Junction
Logan
5
5
10
Whitehorse
Johnsons Crossing
Fort Liard
60°
Yakataga
20
Teslin
Watson Lake
60°
Carcross
Swift River
Lower Post
Smith River
Liard River
Liard River
Mile 75
Haines Apps. #2
Skagway
Atlin
Yakutat
Alsek River
Haines
Cassiar
Muncho Lake
Summit
20
15
15
Taku River
PACIFIC OCEAN
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
Stikine River
Ware
20
Kinaskan Lake
Angoon
140°
135°
130°
125°

Figure 8.51 July mean daily maximum temperature

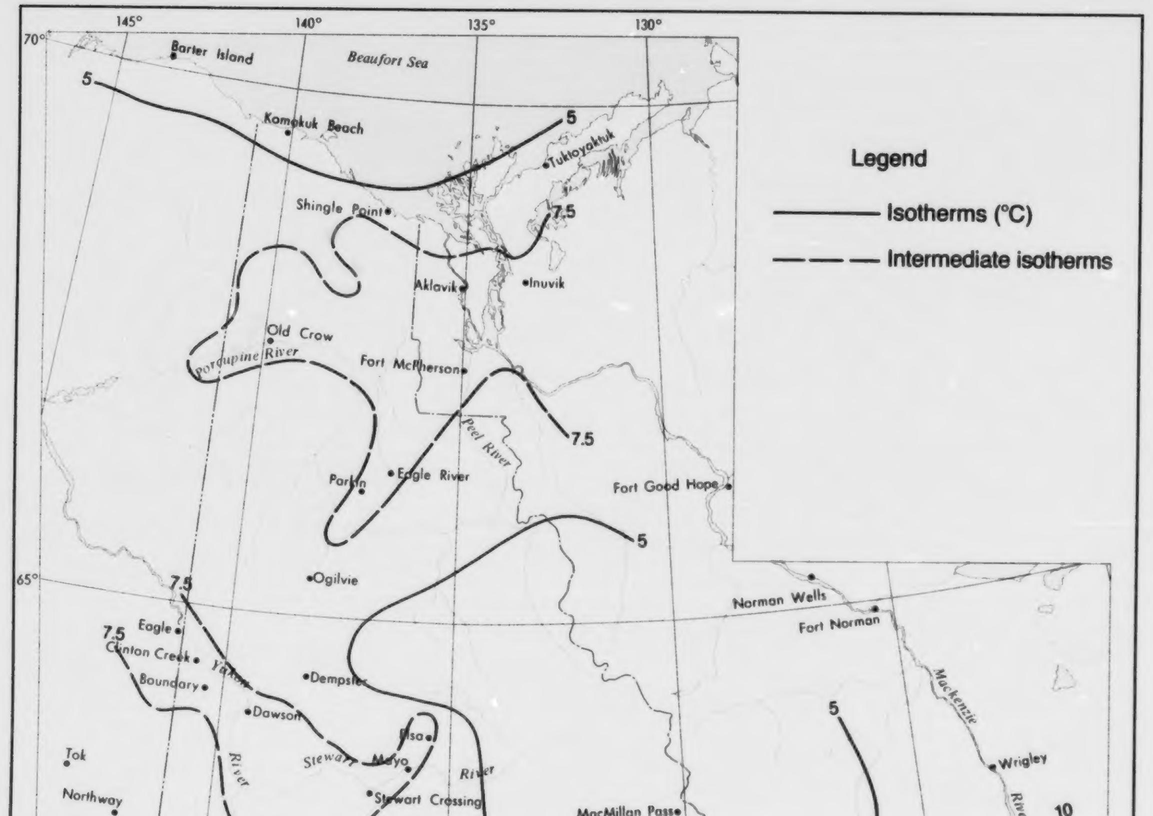

Legend
Isotherms (°C)
Intermediate isotherms
145°
140°
135°
130°
125°
70°
65°
60°
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Eagle River
Parkin
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Mackenzie River
Eagle
Clinton Creek
Boundary
Yukon
Dempster
Dawson
Stewart River
Elsa
Mayo
Stewart Crossing
Tok
Northway
Fort Selkirk
MacMillan Pass
Wrigley
Beaver Creek
Snag
Sheldon Lake
Pelly River
Anvil
Drury Creek
Carmacks
Ross River
Tungsten
South Nahanni River
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Logan
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Alsek River
Mile 75
Haines Apps. #2
Skagway
Atlin
Yakutat
Haines
Cassiar
Muncho Lake
Summit
PACIFIC OCEAN
Gustavus
Juneau
Taku River
Cape Spencer
Telegraph Creek
Dease Lake
Stikine River
Kinaskan Lake
Angoon
Ware
5
7.5
0
−5
10

Figure 8.52 July mean daily minimum temperature

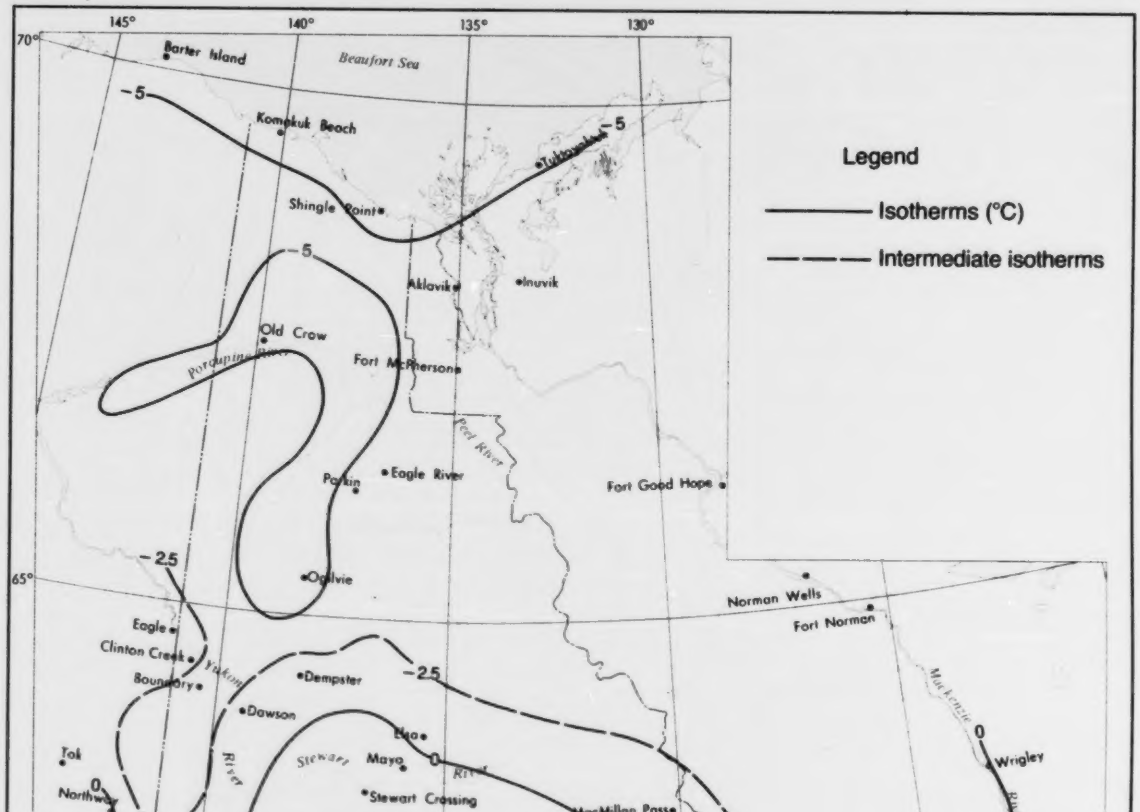

Legend
Isotherms (°C)
Intermediate isotherms
145°
140°
135°
130°
125°
70°
65°
60°
Beaufort Sea
PACIFIC OCEAN
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Eagle River
Parkin
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Yukon River
Dempster
Dawson
Mackenzie River
Elsa
Mayo
Stewart River
Tok
Northway
Stewart Crossing
Wrigley
MacMillan Pass
Fort Selkirk
Beaver Creek
Snag
Sheldon Lake
Pelly River
Anvil
Faro
Drury Creek
Carmacks
Ross River
South Nahanni River
Tungsten
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Carcross
Liard River
Mile 75
Haines Apps. #2
Skagway
Atlin
Yakutat
Haines
Alsek River
Cassiar
Muncho Lake
Summit
Taku River
Dease Lake
Gustavus
Juneau
Cape Spencer
Telegraph Creek
Stikine River
Ware
Kinaskan Lake
Angoon
–5
–5
–5
–2.5
–2.5
0
0
0
0
2.5
2.5
2.5
–5
–10
–5
–5
5
5
5
–2.5

Figure 8.53 October mean daily maximum temperature

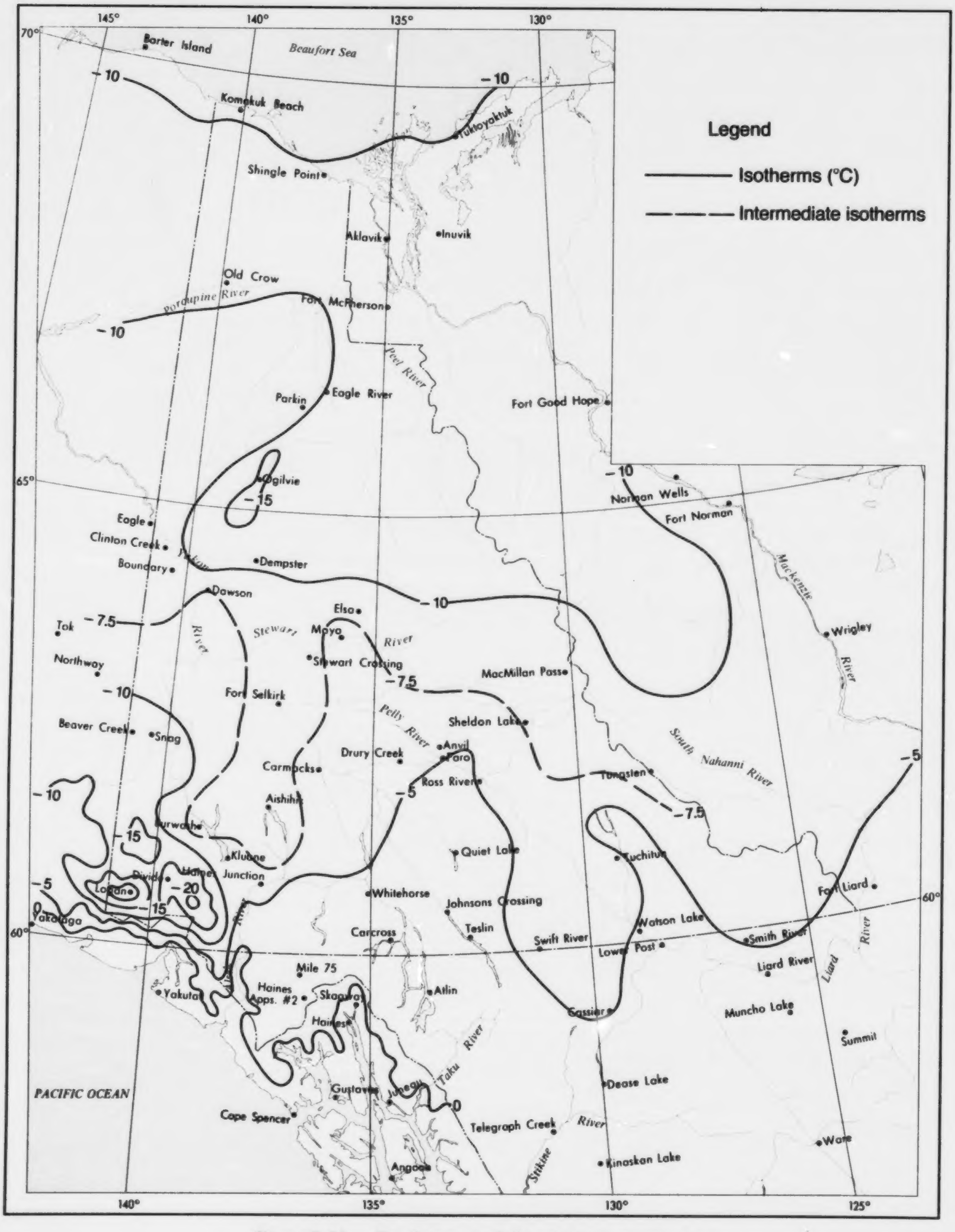

145°
140°
135°
130°
70°
65°
60°
125°
Legend
Isotherms (°C)
Intermediate isotherms
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Yukon
Dempster
Mackenzie
Dawson
Elsa
Tok
Stewart
Mayo
River
Wrigley
River
Northway
Stewart Crossing
MacMillan Pass
Fort Selkirk
Pelly River
Sheldon Lake
South Nahanni River
Beaver Creek
Snag
Anvil
Faro
Drury Creek
Carmacks
Tungsten
Ross River
Aishihik
Burwash
Quiet Lake
Kluane
Tuchitua
Haines Junction
Divide
Logan
Whitehorse
Fort Liard
Johnsons Crossing
Yakataga
Watson Lake
Teslin
Carcross
Swift River
Lower Post
Smith River
Liard River
Liard River
Mile 75
Yakutat
Haines Apps. #2
Skagway
Atlin
Haines
Cassiar
Muncho Lake
Summit
Taku River
PACIFIC OCEAN
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
Stikine River
Ware
Angoon
Kinaskan Lake
– 10
– 10
– 10
– 10
– 15
– 10
– 10
– 7.5
– 7.5
– 7.5
– 10
– 10
– 5
– 5
– 15
– 5
– 20
– 15
0
0
– 5

Figure 8.54 October mean daily minimum temperature

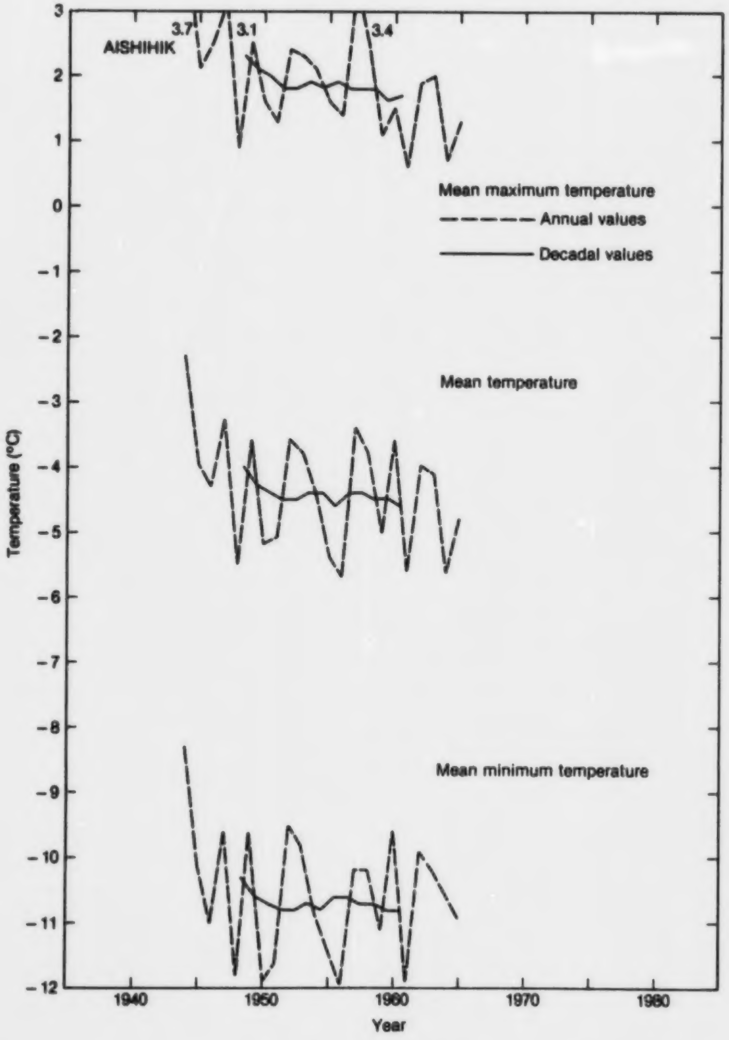


Figure 8.55 Year-to-year annual mean, mean maximum and mean minimum temperatures, and corresponding ten-year running means for Aishihik

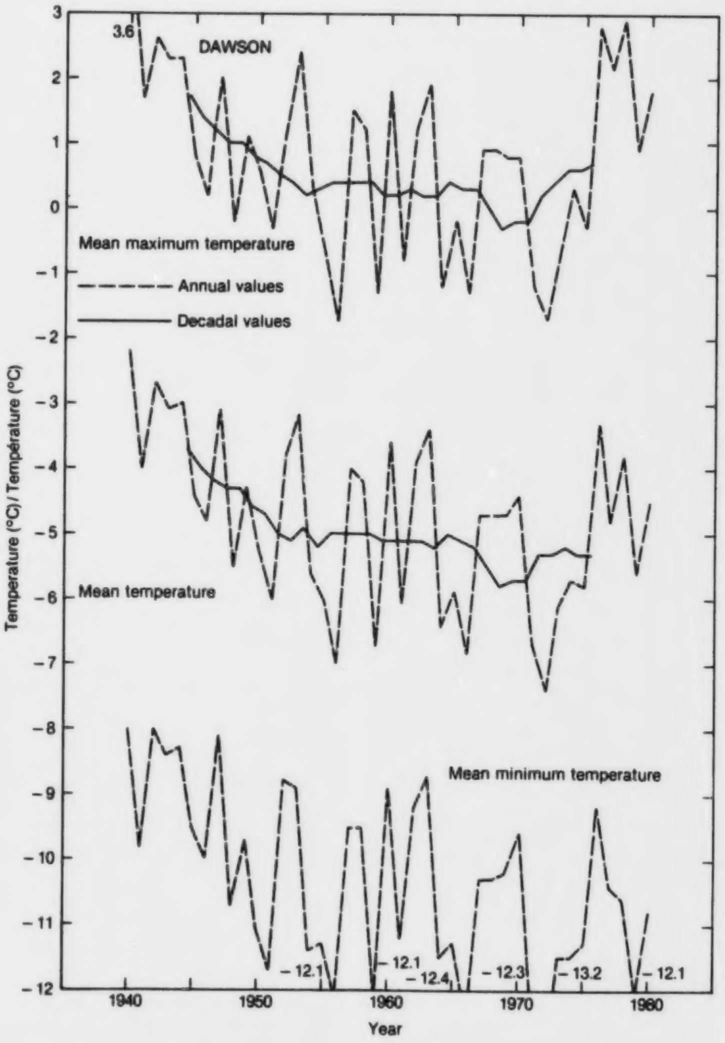


Figure 8.56 Year-to-year annual mean, mean maximum and mean minimum temperatures, and corresponding ten-year running means for Dawson

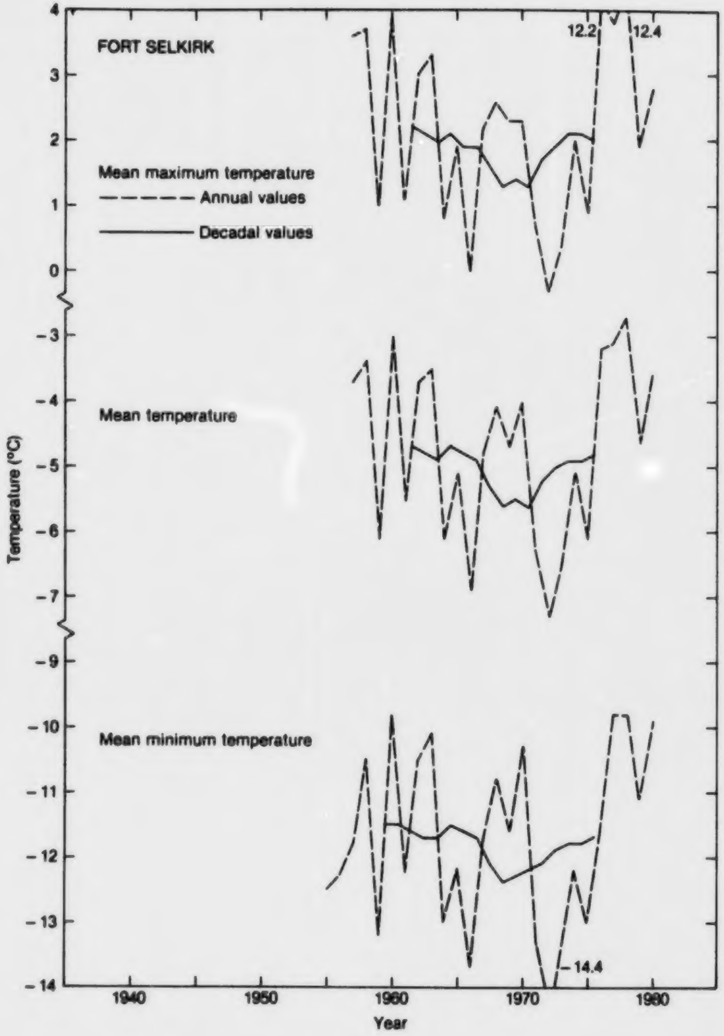


Figure 8.57 Year-to-year annual mean, mean maximum and mean minimum temperatures, and corresponding ten-year running means for Fort Selkirk

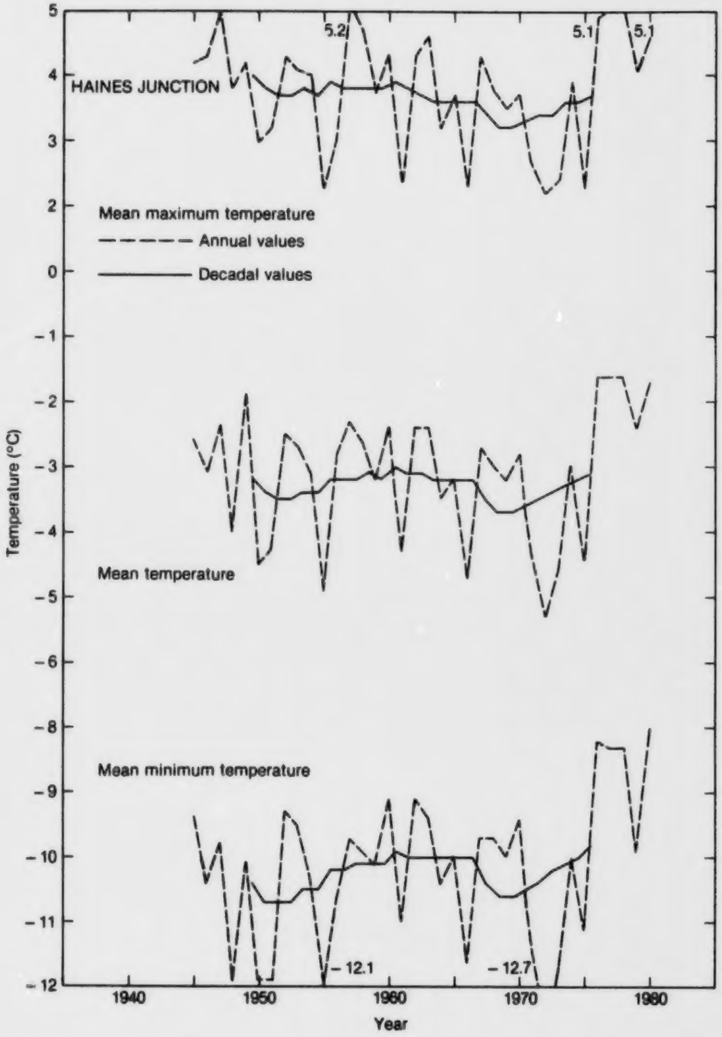


Figure 8.58 Year-to-year annual mean, mean maximum and mean minimum temperatures, and corresponding ten-year running means for Haines Junction

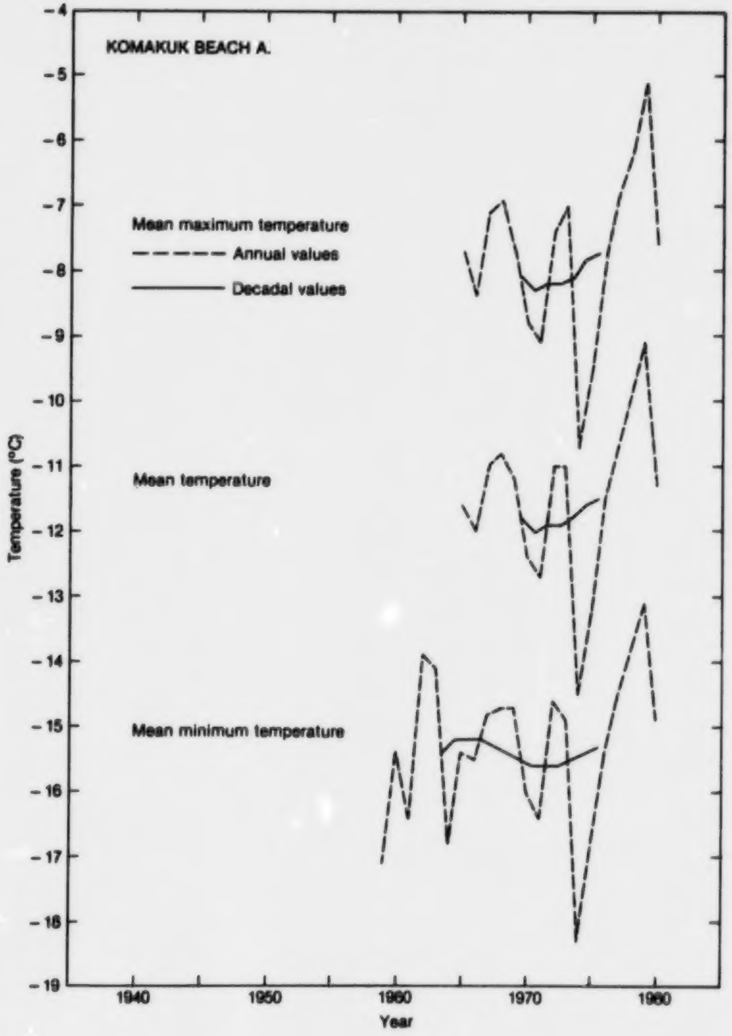


Figure 8.59 Year-to-year annual mean, mean maximum and mean minimum temperatures, and corresponding ten-year running means for Komakuk Beach A

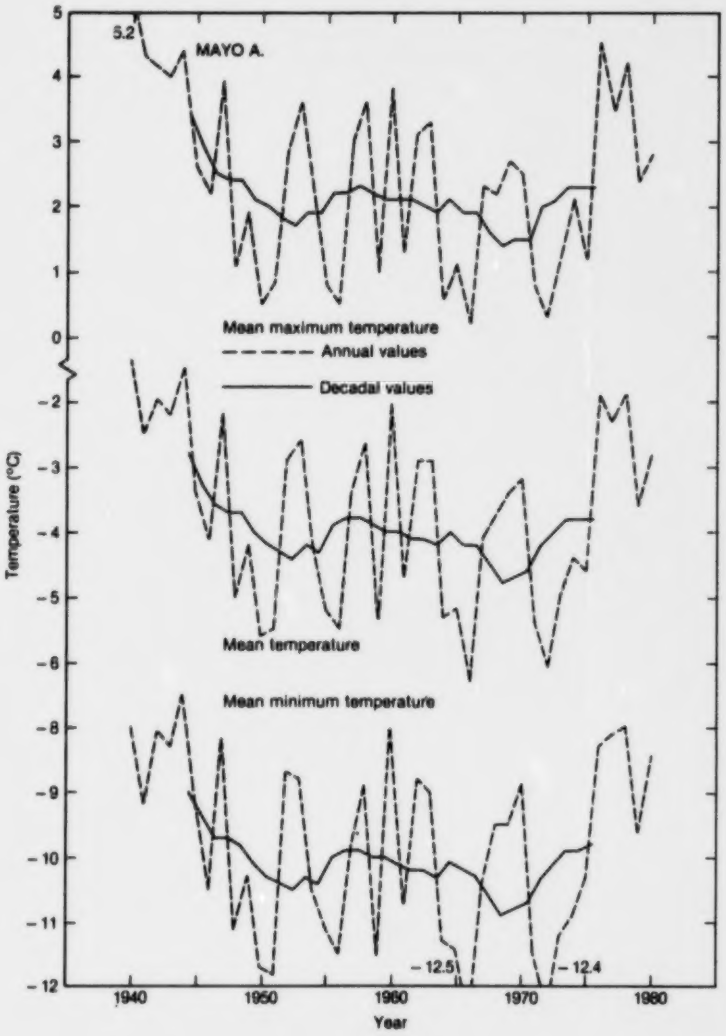


Figure 8.60 Year-to-year annual mean, mean maximum and mean minimum temperatures, and corresponding ten-year running means for Mayo A

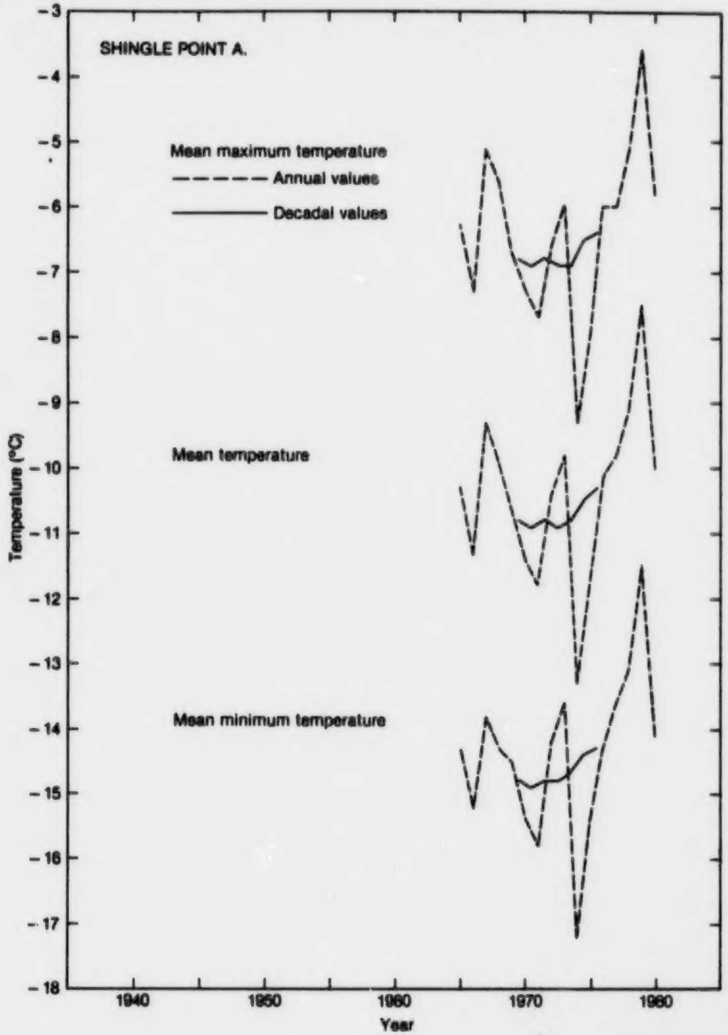


Figure 8.61 Year-to-year annual mean, mean maximum and mean minimum temperatures, and corresponding ten-year running means for Shingle Point A

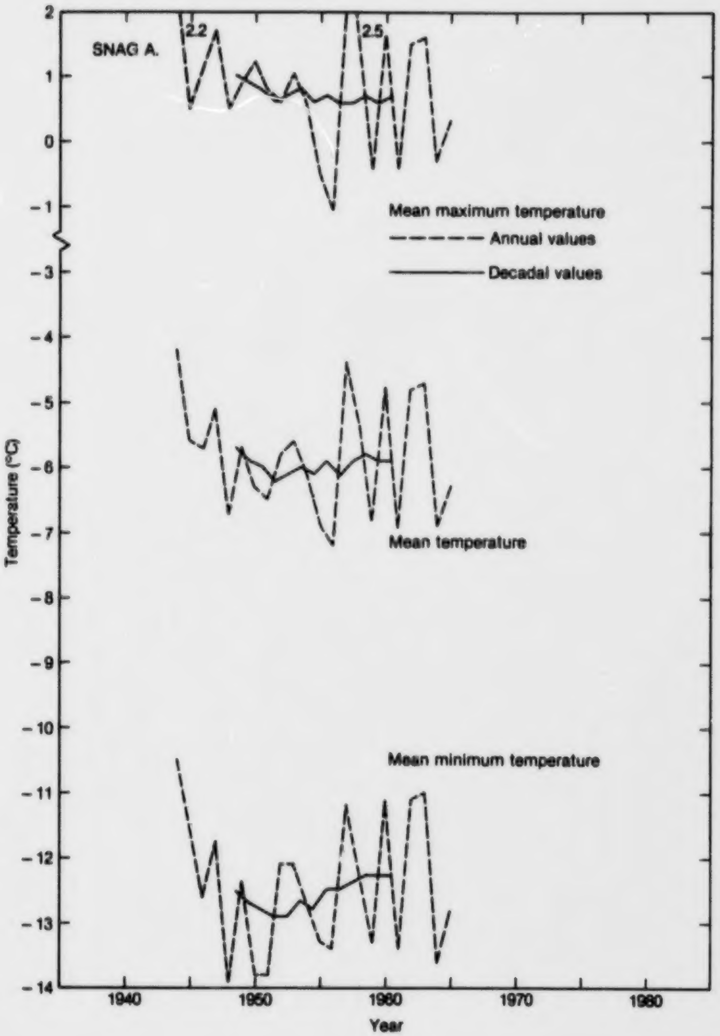


Figure 8.62 Year-to-year annual mean, mean maximum and mean minimum temperatures, and corresponding ten-year running means for Snag A

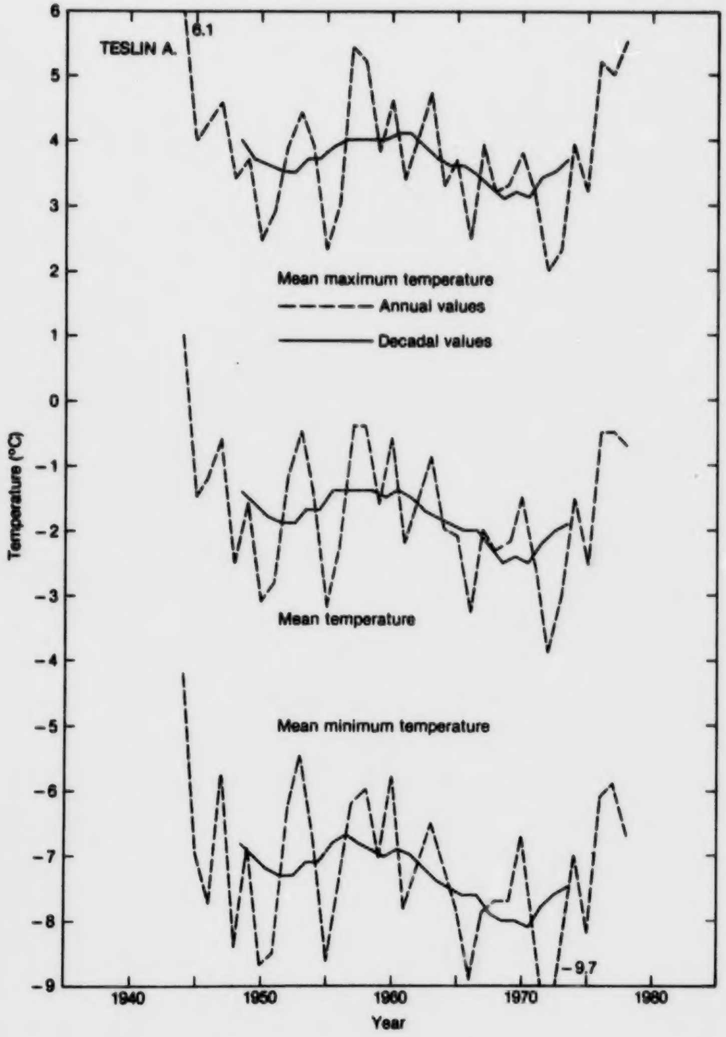


Figure 8.63 Year-to-year annual mean, mean maximum and mean minimum temperatures, and corresponding ten-year running means for Teslin A

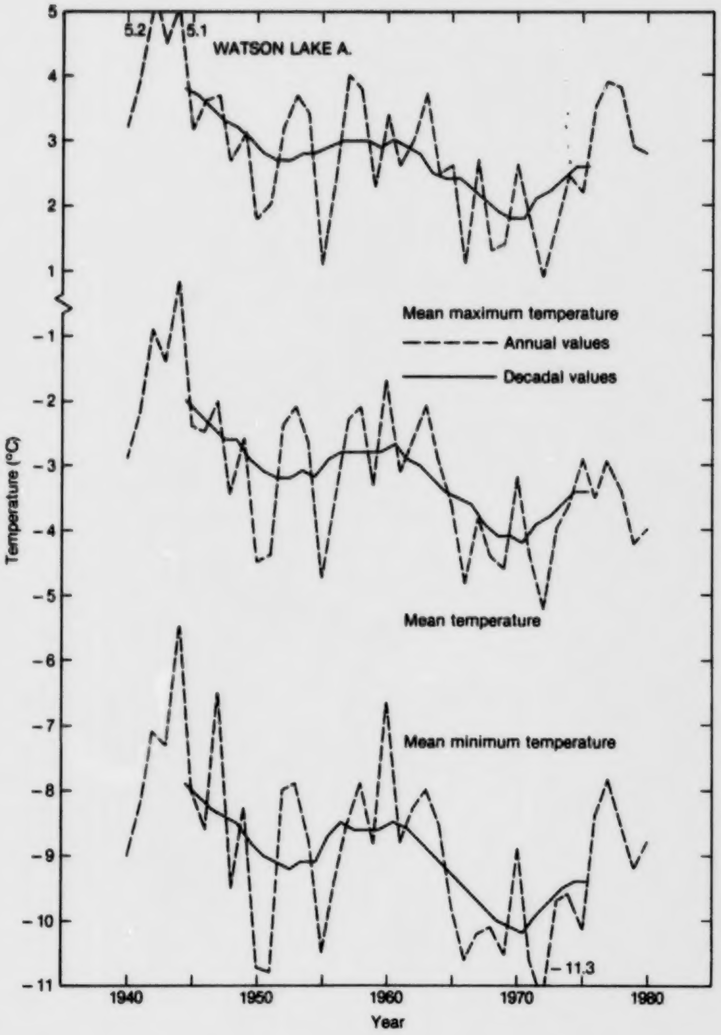


Figure 8.64 Year-to-year annual mean, mean maximum and mean minimum temperatures, and corresponding ten-year running means for Watson Lake A

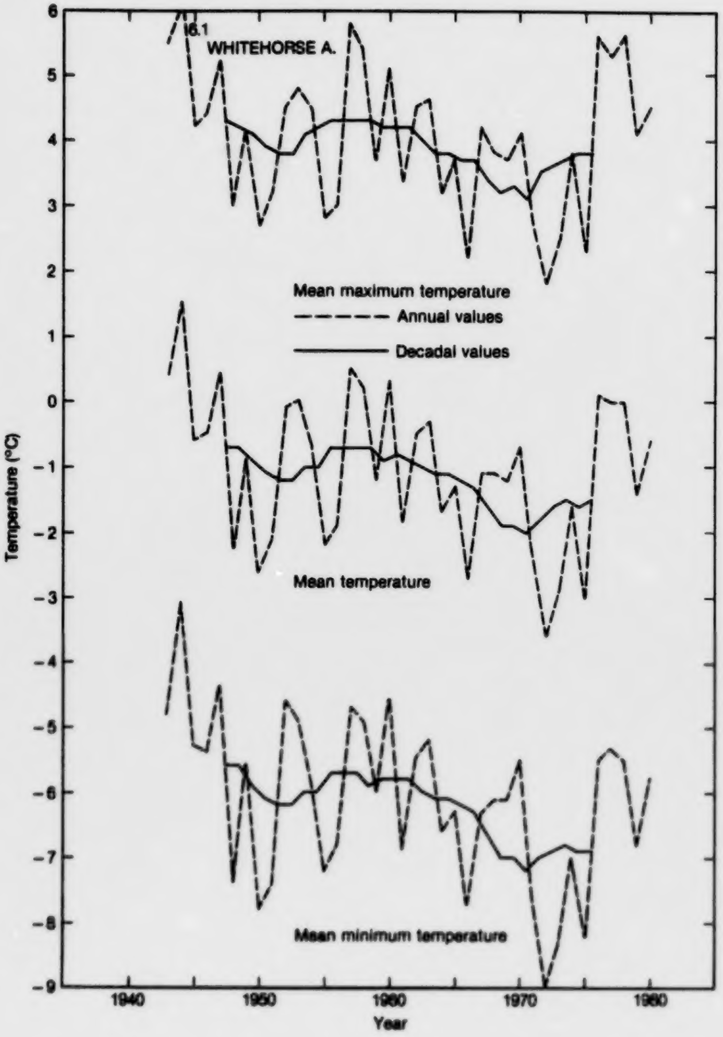


Figure 8.65 Year-to-year annual mean, mean maximum and mean minimum temperatures, and corresponding ten-year running means for Whitehorse A

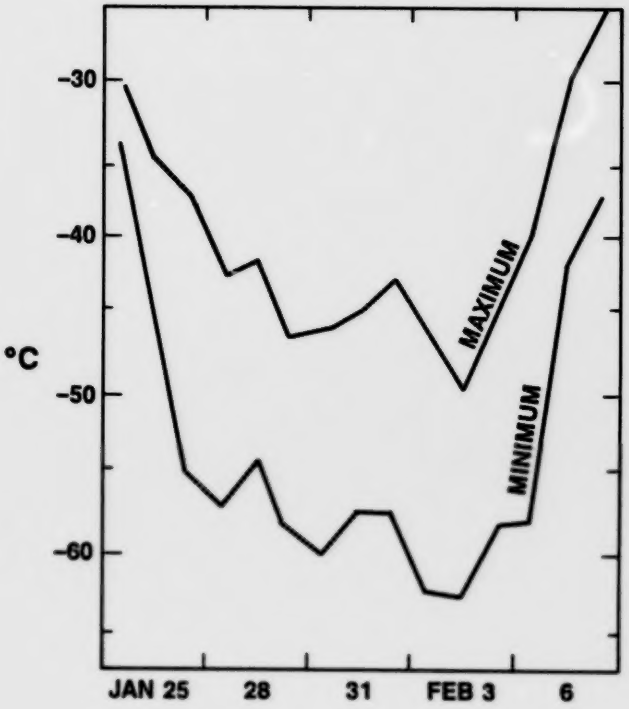


Figure 8.66 Temperature during a record-breaking cold spell at Snag (Kendrew and Kerr, 1955)

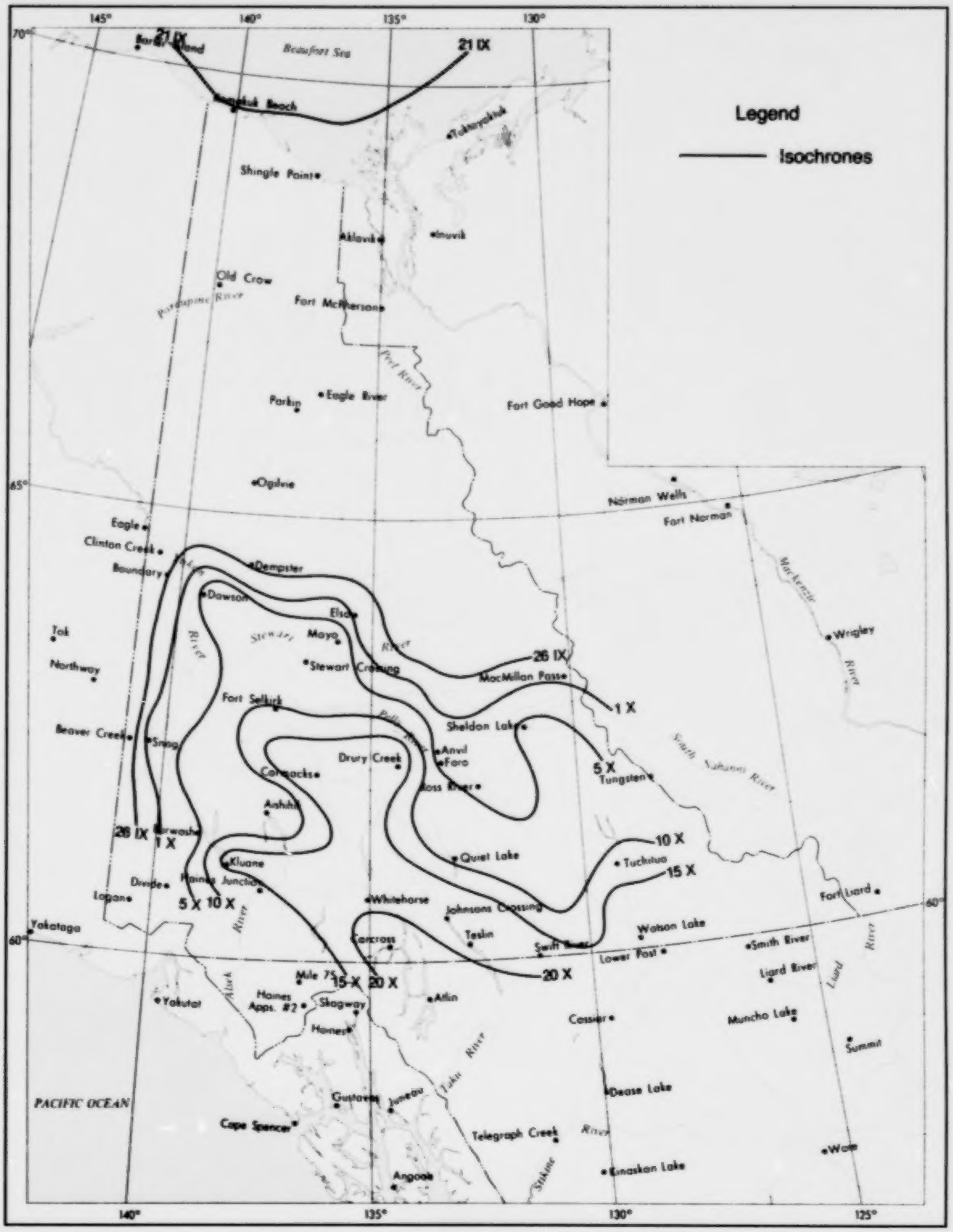

145°
140°
135°
130°
70°
65°
60°
125°
Beaufort Sea
21 IX
21 IX
Barter Island
Komakuk Beach
Tuktoyaktuk
Legend
Isochrones
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Stewart
River
Stewart Crossing
Mackenzie
Wrigley
River
Tok
Northway
26 IX
MacMillan Pass
1 X
Fort Selkirk
Sheldon Lake
Beaver Creek
Snag
Anvil
Faro
5 X
Tungsten
South Nahanni River
Drury Creek
Carmacks
Ross River
Aishihik
26 IX
Burwash
1 X
10 X
Quiet Lake
Tuchitua
15 X
Kluane
Divide
Haines Junction
Logan
5 X
10 X
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Watson Lake
Teslin
Swift River
Lower Post
Smith River
Carcross
Liard River
Liard
River
Mile 75
15 X
20 X
20 X
Alsek
River
Haines Apps. #2
Yakutat
Skagway
Atlin
Cassiar
Muncho Lake
Haines
Taku River
Summit
PACIFIC OCEAN
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
River
Stikine
Ware
Angoon
Kinaskan Lake

Figure 8.67 Mean dates of the beginning of winter

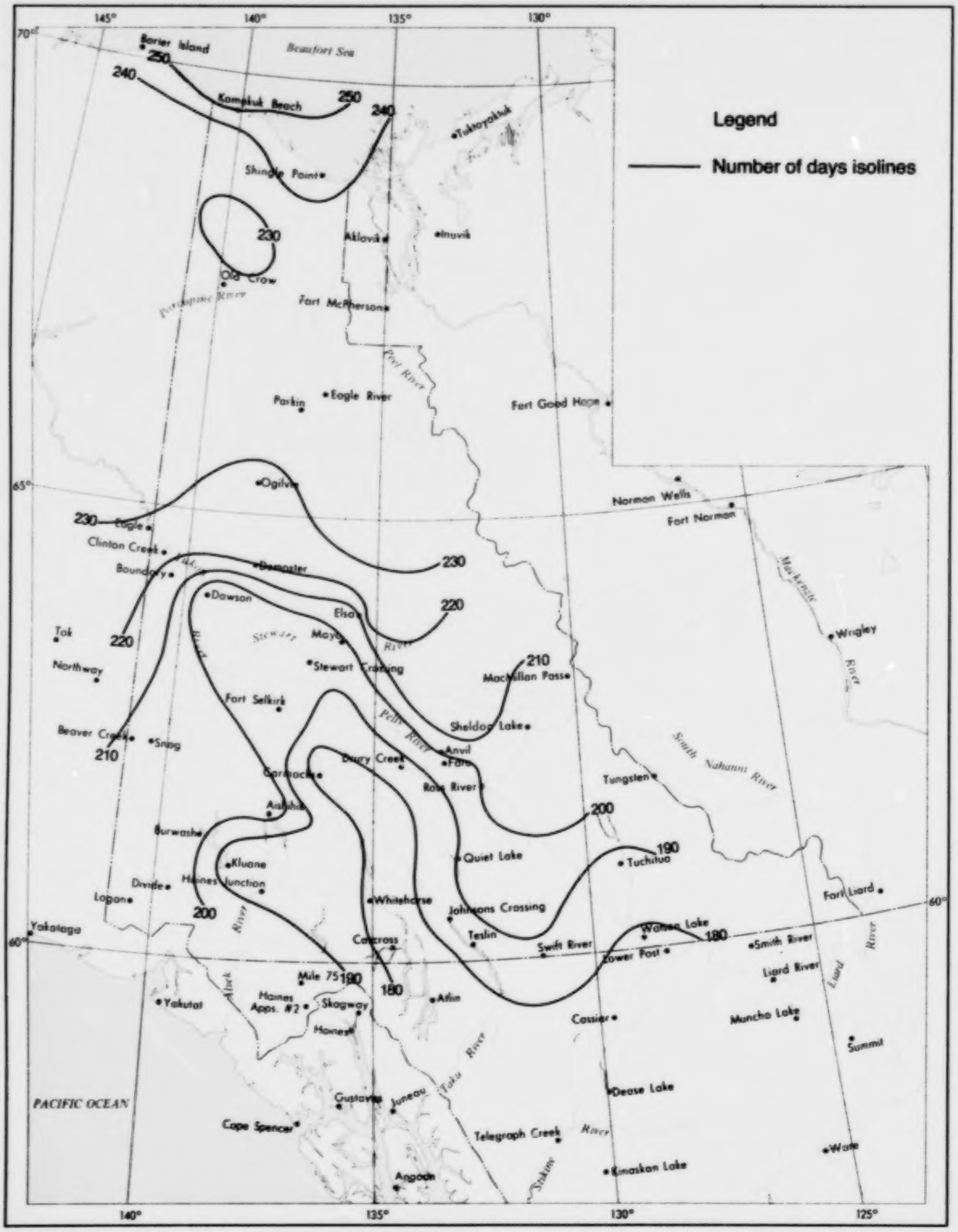

Legend
Number of days isolines
145°
140°
135°
130°
125°
70°
65°
60°
Beaufort Sea
Barter Island
Komakuk Beach
Shingle Point
Tuktoyaktuk
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Stewart River
Stewart Crossing
Tok
Northway
Fort Selkirk
Macmillan Pass
Sheldon Lake
Mackenzie River
Wrigley
Beaver Creek
Snag
Pelly River
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
South Nahanni River
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Lopone
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Mile 75
Haines Apps. #2
Skagway
Haines
Atlin
Yakutat
Alsek River
Cassiar
Muncho Lake
Summit
Taku River
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
Stikine River
Ware
Kinaskan Lake
Angoon
PACIFIC OCEAN
250
240
230
220
210
200
190
180

Figure 8.68 Mean duration of winter

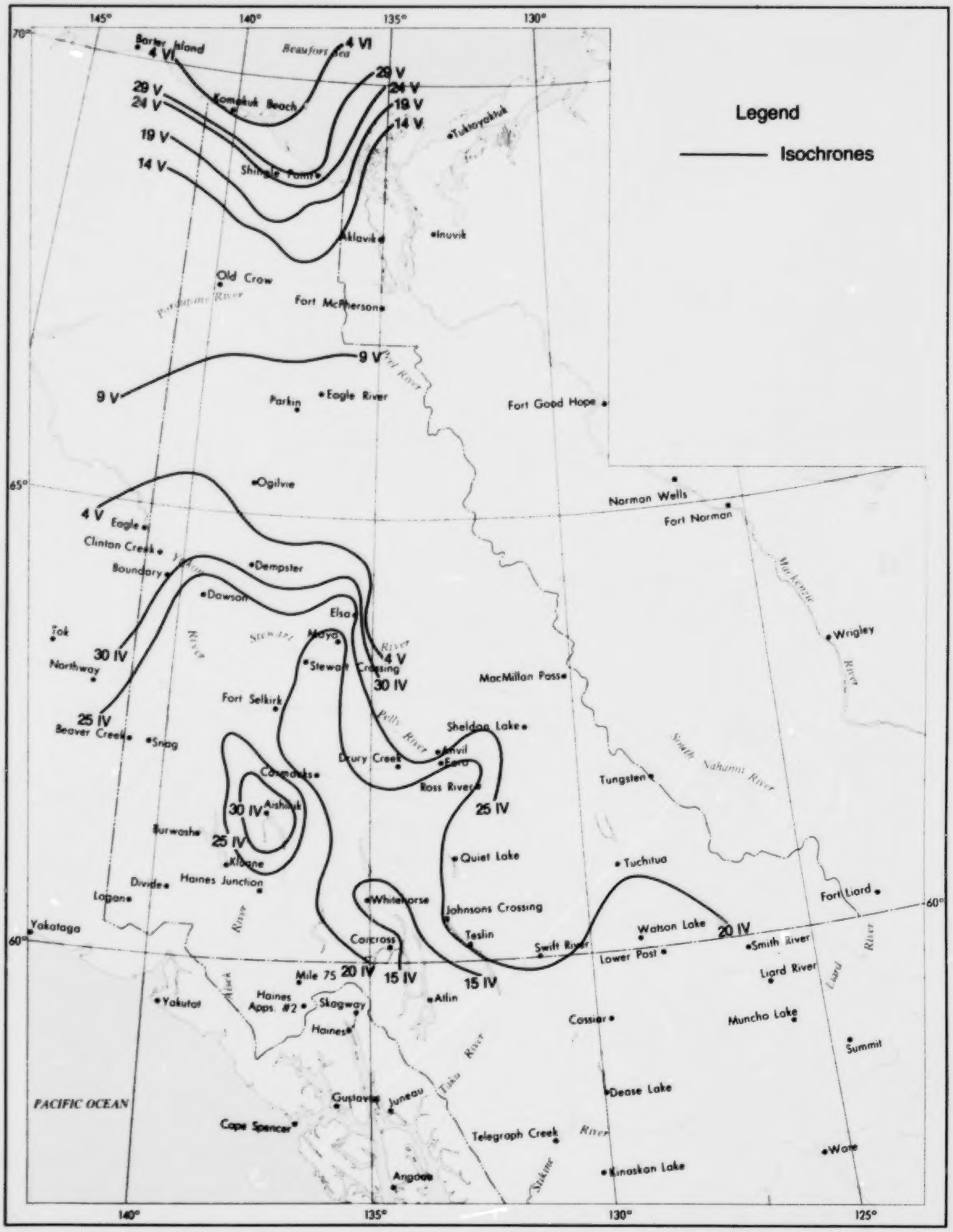

Legend
Isochrones
Barter Island
Beaufort Sea
Komakuk Beach
Shingle Point
Tuktoyaktuk
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Stewart River
Stewart Crossing
Tok
Northway
Mackenzie
Wrigley
River
MacMillan Pass
Fort Selkirk
Pelly River
Sheldon Lake
Beaver Creek
Snag
Drury Creek
Anvil
Faro
Carmacks
Ross River
Tungsten
South Nahanni River
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Logan
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Carcross
Teslin
Watson Lake
Swift River
Lower Post
Smith River
Liard River
Mile 75
Haines Apps. #2
Skagway
Atlin
Yakutat
Alsek River
Haines
Cassiar
Muncho Lake
Summit
Taku River
Dease Lake
PACIFIC OCEAN
Gustavus
Juneau
Cape Spencer
Telegraph Creek
Stikine River
Ware
Kinaskan Lake
Angoon
4 VI
29 V
24 V
19 V
14 V
9 V
4 V
30 IV
25 IV
20 IV
15 IV
70°
65°
60°
145°
140°
135°
130°
125°

Figure 8.69 Mean dates of the end of winter

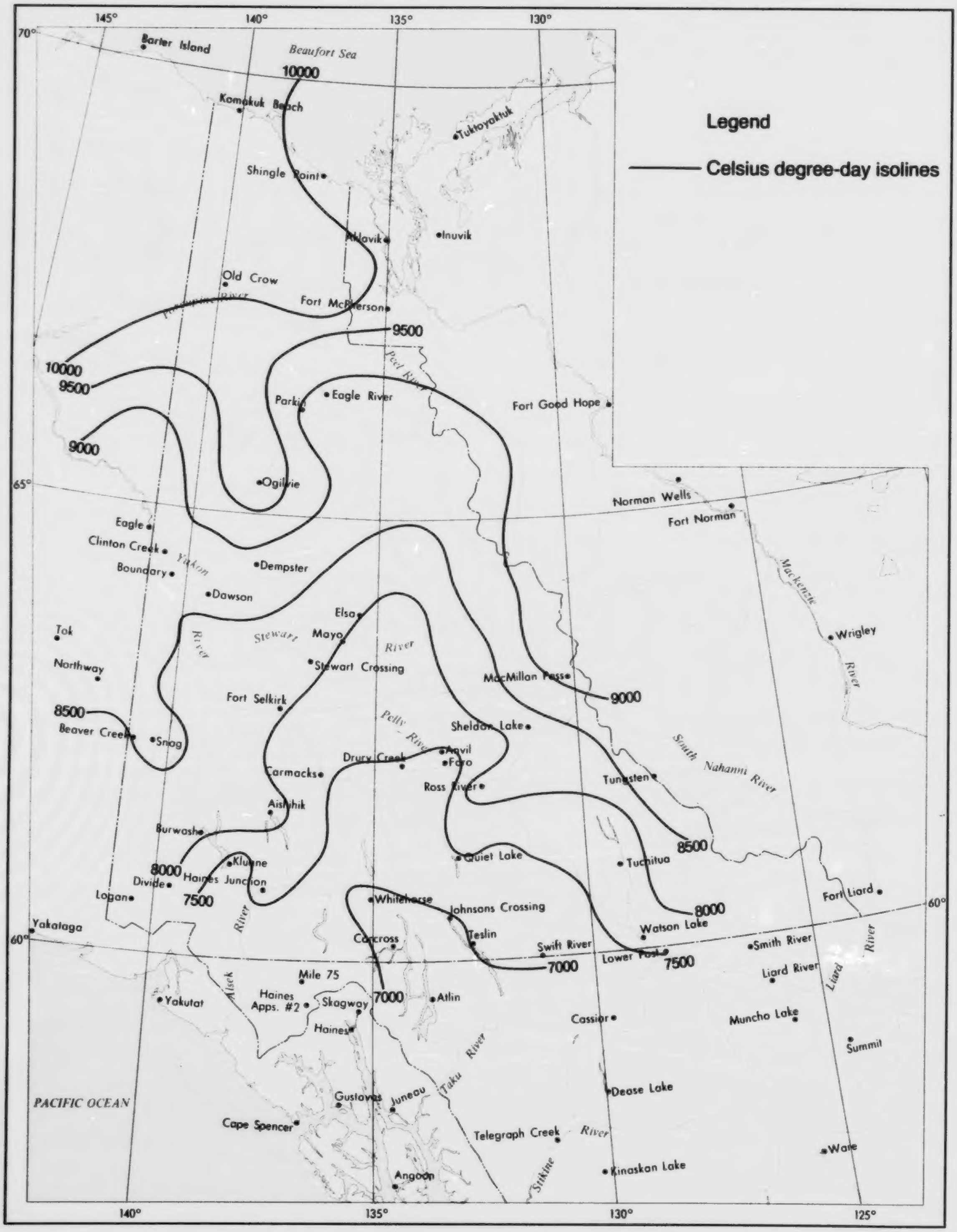

Legend
Celsius degree-day isolines
145°
140°
135°
130°
125°
70°
65°
60°
Beaufort Sea
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Yukon
Boundary
Dempster
Dawson
Elsa
Mayo
Stewart River
Stewart Crossing
Tok
Northway
Mackenzie
Wrigley
River
MacMillan Pass
Fort Selkirk
Beaver Creek
Snag
Pelly River
Sheldon Lake
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
South Nahanni River
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Logan
Yakataga
Alsek
River
Whitehorse
Johnsons Crossing
Teslin
Fort Liard
Watson Lake
Lower Post
Smith River
Carcross
Swift River
Liard River
Liard
River
Mile 75
Haines Apps. #2
Skagway
Atlin
Yakutat
Haines
Cassiar
Muncho Lake
Summit
Taku
River
PACIFIC OCEAN
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
River
Stikine
Ware
Angoon
Kinaskan Lake
10000
10000
9500
9500
9000
9000
8500
8500
8000
8000
7500
7500
7000
7000

Figure 8.70 Mean annual totals of heating degree-days

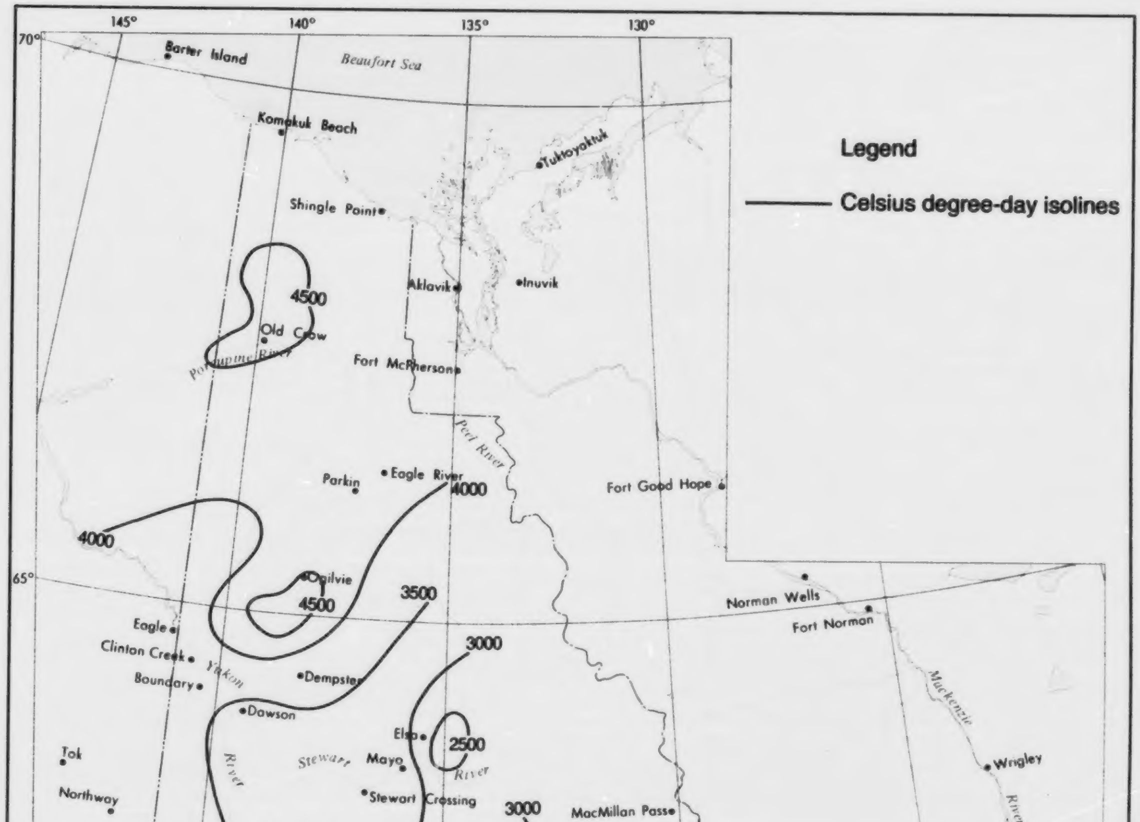

145°
140°
135°
130°
70°
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
Legend
Celsius degree-day isolines
Shingle Point
4500
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
4000
Fort Good Hope
4000
65°
Ogilvie
4500
3500
Norman Wells
Fort Norman
Eagle
Clinton Creek
Yukon
Boundary
Dempster
3000
Mackenzie
Dawson
Elsa
2500
Tok
Stewart
Mayo
River
Wrigley
River
Northway
Stewart Crossing
3000
MacMillan Pass
River
Fort Selkirk
Pelly
Beaver Creek
Snag
Sheldon Lake
River
Anvil
Faro
South Nahanni River
Drury Creek
3500
Carmacks
Ross River
3500
Tungsten
Aishihik
Burwash
3000
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
2500
Logan
Whitehorse
Fort Liard
Johnsons Crossing
60°
Yakataga
60°
River
Watson Lake
Teslin
Carcross
Swift River
Lower Post
3000
Smith River
Liard River
Liard
River
Mile 75
2000
2500
Alsek
Haines Apps. #2
Skagway
Atlin
Yakutat
Cassiar
Muncho Lake
Haines
2000
Taku River
Summit
PACIFIC OCEAN
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
River
Ware
Stikine
Kinaskan Lake
Angoon
140°
135°
130°
125°

Figure 8.71 Mean annual totals of freezing degree-days

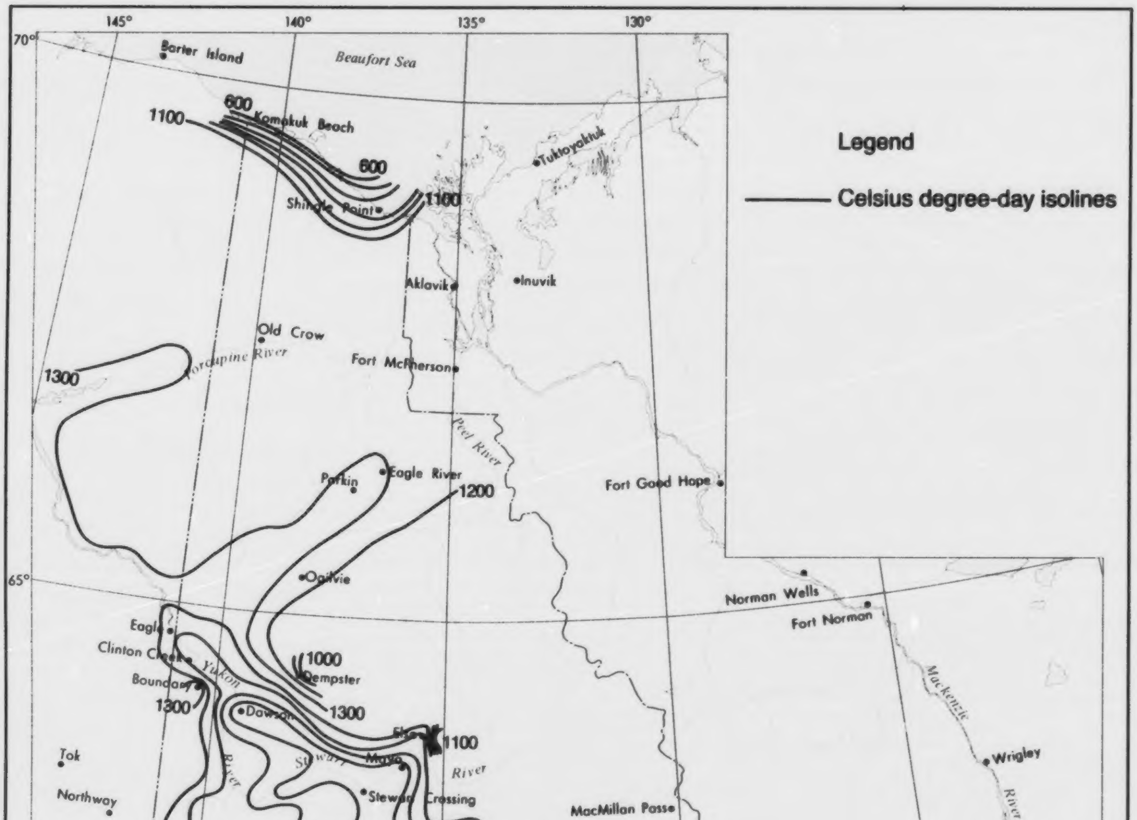

145°
140°
135°
130°
70°
65°
60°
Barter Island
Beaufort Sea
1100
600
Komakuk Beach
600
1100
Shingle Point
Tuktoyaktuk
Legend
Celsius degree-day isolines
Aklavik
Inuvik
Old Crow
Porcupine River
1300
Fort McPherson
Peel River
Parkin
Eagle River
1200
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Yukon
1000
Dempster
Boundary
1300
Dawson
1300
Mackenzie
Elsa
1100
Tok
Stewart
Mayo
River
Wrigley
Northway
River
Stewart Crossing
MacMillan Pass
River
Fort Selkirk
1700
1400
Pelly
Sheldon Lake
Beaver Creek
Snag
1200
Faro
Carmacks
Drury Creek
1600
Ross River
South Nahanni River
Tungsten
Aishihik
Burwash
1400
Quiet Lake
Kluane
Tuchitua
Divide
Haines Junction
1700
Whitehorse
1400
Fort Liard
Logan
Alsek
River
Johnsons Crossing
1500
Yakataga
Carcross
Teslin
1300
Watson Lake
1600
Smith River
1500
1600
Swift River
Lower Post
1700
1500
Liard River
Mile 75
Liard
River
Haines Apps. #2
Skagway
Atlin
1500
Yakutat
Alsek
Cassiar
Muncho Lake
Haines
River
Summit
Taku
PACIFIC OCEAN
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
River
Ware
Stikine
Kinaskan Lake
Angoon
140°
135°
130°
125°

Figure 8.72 Mean annual totals of thawing degree-days

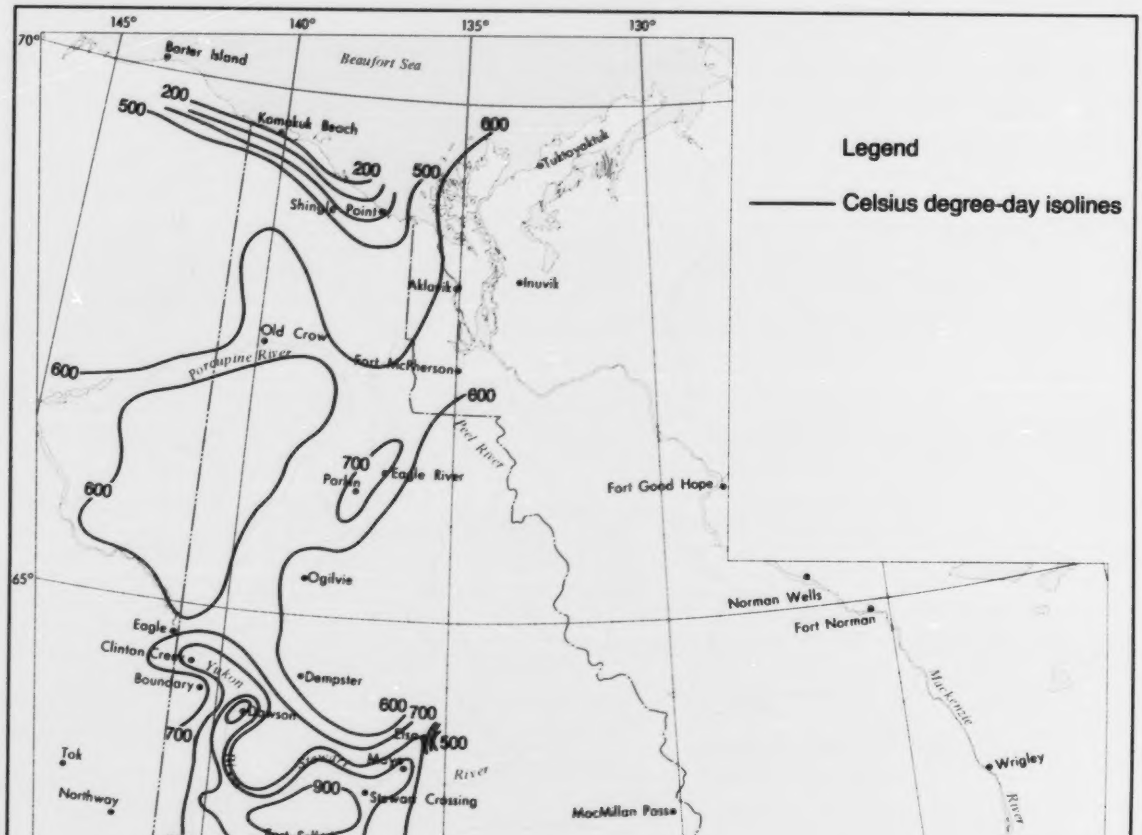

Legend
Celsius degree-day isolines
Beaufort Sea
Barter Island
Komakuk Beach
Shingle Point
Tuktoyaktuk
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Yukon
Dawson
Dempster
Elsa
Mayo
Stewart Crossing
Fort Selkirk
Tok
Northway
Beaver Creek
Snag
Carmacks
Drury Creek
Pelly River
Sheldon Lake
Ross River
MacMillan Pass
Mackenzie
Wrigley
River
South Nahanni River
Tungsten
Aishihik
Burwash
Kluane
Haines Junction
Divide
Logan
Yakataga
Quiet Lake
Tuchitua
Whitehorse
Johnsons Crossing
Teslin
Carcross
Swift River
Watson Lake
Lower Post
Smith River
Fort Liard
Liard River
Yakutat
Alsek
Mile 75
Haines Apps. #2
Skagway
Haines
Atlin
Cassiar
Muncho Lake
Summit
Taku River
PACIFIC OCEAN
Gustavus
Juneau
Cape Spencer
Dease Lake
Telegraph Creek
Stikine
Kinaskan Lake
Angoon
Ware
200
500
600
700
800
900
70°
65°
60°
145°
140°
135°
130°
125°

Figure 8.73 Mean annual totals of growing degree-days

9. PRECIPITATION

The primary prerequisites for precipitation are a moisture source and a lifting mechanism. The source can be far from the area of deposition while the lifting process can be dynamic due to synoptic scale systems (most common in Yukon in the fall and early winter), convective processes in summer, and orographic lifting in all seasons.

Precipitation over mountainous terrain varies with slope, aspect, elevation, orientation, and degree of shelter. Many of the problems with measuring and mapping precipitation in such areas have been discussed by McKay and Thomas (1971). Spillover on the leeward side of ridges can be significant, particularly for snowfall; it is a form of redistribution which is most important in measurement of snowfall as the wind can carry snowflakes many kilometres before they come to rest, most often against some barrier.

Snow measurements can be biased because snow courses may be located for convenience or economy of access, to give a good index of runoff or for other reasons. Snow course data are indispensable in streamflow forecasting, but are inadequate for determination of annual precipitation. Remote storage gauges give information on total precipitation but none directly on snow depth and distribution. Other concerns with data are discussed in chapter 4. Added to the problem of measurement is the non-trivial one of interpretation due to the natural variability of precipitation in mountainous terrain and the large variability from year-to-year.

9.1 Precipitation Regime

In previous sections, particularly related to temperature, the continental nature of Yukon climate has been stressed. This is also the case with precipitation especially over the lowlands and most interior valleys. The distribution of total precipitation throughout the year for selected south to north stations at low elevations depicted in Figure 9.1 (a), shows a pronounced summer maximum which is typical of continental regions. The later winter and spring are quite dry while there is more precipitation in the fall than in winter.

On the Pacific coast, Vancouver receives its least precipitation in summer with a minimum in July (Figure 9.1 (a)). This typical characteristic of maritime climate is also evident at Yakutat, Alaska. Note in Figure 9.1 (b), Yakutat receives the lowest percentage of its annual total in June and its maximum in the fall and early winter. Precipitation generating synoptic scale storms are most frequent along the panhandle in the fall and early winter whereas the primary Pacific storm track shifts south toward Vancouver in January (Figure 12.1) to contribute to its pattern shown in Figure 9.1 (a).

The precipitation regime in Yukon is not typically continental everywhere. According to Hare and Thomas (1974), most of Yukon is in the Cordilleran climatic region partly because of the contrasting nature of its climate which is not simply either continental or maritime. The Cordillera is certainly diverse in its topography and flora, as well as climate which is evident from a short journey in any of its sub-regions.

In the snow country of southeastern British Columbia, a zone in the southern Cordillera, there are two precipitation maxima – one in summer and a second in winter. This pattern, as it prevails over the contiguous mountain parks is described in detail by Janz and Storr (1977). Interior mountain climatic regions of Yukon exhibit similar patterns.

The great variability of precipitation patterns in Yukon is demonstrated by the diversity of the plots of monthly percentage of annual total precipitation in Figure 9.1 (a) to (e). The patterns of Kluane Lake and Aishihik are very similar (Figure 9.1 (b)), yet differ significantly from those at Haines Junction and Carcross where two maxima rather than one are evident. The latter stations, in the rain shadow of the St. Elias and Coast Mountains, seem to rely on the fall cyclonic acitvity in the Gulf of Alaska just as much as the summer convection showers for their moisture; in fact, at Carcross the synoptic process seems most important.

The variation from west to east across southern Yukon is shown in Figure 9.1 (c). In the Pelly-Cassiar Mountain climatic region the precipitation pattern at three typical locations, Cassiar, BC, Quiet Lake and Swift River (Figure 9.1 (d)) are very similar with the greatest percentage of total precipitation falling in winter and a lower secondary maximum in July. Note the marked summer maximum at Tungsten, NWT, in the Ogilvie-Mackenzie Mountains climatic region. It fits with the patterns for other high-country stations across central Yukon shown in Figure 9.1 (e). All of these stations are above 1000m in elevation and most receive more than 50% of their total precipitation in solid form (Figure 9.2 and 9.3). Tungsten is the exception with just under 50% of its total in solid form.

Annual precipitation amounts over interior Yukon range from less than 200mm along the north coast to more than 700mm over the higher terrain on the windward (southwest) slopes of the Mackenzie-Selwyn Mountains. The extreme southwestern part of the territory on the seaward slope of the St. Elias range receives precipitation amounts near 2000mm. Even greater amounts, up to 4000mm, fall on the Alaskan panhandle.

9.2 Precipitation-Topography Relationship

Some effects of topography on precipitation were discussed in section 5.2.2 and effects of moisture sources in section 5.2.3. An indication of some topographic effects on various precipitation parameters can be gained from graphs in Figure 9.2 and 9.3 which are plotted for stations on a southwest-northeast transect and west-east transect across southern Yukon. Note that a few stations lie directly on the profile line, especially on the west-east profile; an indication of the station location relative to the profile line may be gained from Figures A and B. These illustrations are intended to show general trends, not precise elevation-precipitation relationships. For example, in Figure 9.3 Quiet Lake (N of the line) and Swift River (S of the line) are in fact both in the Pelly-Cassiar Mountains region which has a northwest-southeast orientation crossing the profile line about mid-way between the locations shown for these stations. As well the line graphs are for ease of display – they do not depict conditions between stations. Over the St. Elias Mountains the major snow accumulation zone is between 1500m and 3000m with solid precipitation the norm above 3000m. At the higher elevation the % solid of total precipitation is 100%.

At lower stations, in particular those in valleys of the Upper Yukon-Stikine and Central Yukon Basin climatic regions the annual total precipitation is generally less than 300mm (Figure 9.2). Kluane Lake, Aishihik, and Carmacks are in the rain shadow of the St. Elias Mountains and the greatest impact is at Kluane Lake. Aishihik is the highest in elevation of the three; this elevation difference appears to be responsible for more days with precipitation, in particular more days with snow than at its neighbours. At almost all stations below 800m in elevation more than 50% of the total precipitation falls as rain. Note that at Aishihik in spite of a high number of days with snow, most of the precipitation falls as rain in summer (Figure 9.1 (b)).

Total precipitation in the Liard Basin region is significantly higher than in other southern basin regions; this is not entirely due to elevation. Also, total precipitation east of the continental divide, in the Ft. Simpson-Ft. Nelson area is higher than in the Upper Yukon-Stikine and Central Yukon Basin regions. In southeastern Yukon and leeward of the Rockies, proximity to synoptic storm tracks and favoured locations for cyclogenesis contribute significantly to the total precipitation values.

The general increase in precipitation with elevation is demonstrated by the bar graphs of total precipitation in Figures 9.2 and 9.3. Stations above 700-800m receive much more precipitation than valley stations. At most higher stations especially in the Pelly-Cassiar Mountains region, such as at Quiet Lake and Swift River, it is not surprising that more of the total precipitation is in solid than liquid form (Figure 9.3) in view of the greater percentage of precipitation in the fall and winter months. Although precipitation generally increases with elevation, the magnitude of the change varies significantly from place to place.

Eley and Findlay (1977) found that regional precipitation patterns in Yukon varied markedly between adjacent stations – stations in the same locality with similar topography had large differences in seasonal precipitation accumulation. They found no consistent decrease or increase in precipitation with elevation among their short-term mesoscale observations. A comparison of values at hilltop storage gauges to those at nearby valley stations yielded precipitation gradients ranging from -11.2mm/100m to +12.8mm/100m.

Other comparisons (not hilltop pairs) gave values from 15 to 50mm/100m. For mapping purposes they chose an arbitrary value of 20mm/100m which was considered reasonably typical. Precipitation mapping systems that follow the contours of the terrain on a one to one basis can, for some localities be grossly in error.

Sporns (1964) reported rainfall increases from 1.5 to 1.8 times between Vancouver and Mosquito Creek, a station on the slopes north of the city, the ratio increasing with a longer-duration rainfalls. He attributes this increase to a prolonging of the high-intensity storms by orographic lifting. Orographic lifting is most effective at enhancing precipitation amounts particularly for slow moving synoptic scale systems such as those that stall in the Gulf of Alaska and maintain consistent upslope winds along the coast for prolonged periods.

The same phenomenon occurs with the slow moving "cold lows" common to western Canada including Yukon. Such lows are best known for heavy rainfall over the foothills of the Rockies where upslope circulation contributes significantly to higher precipitation amounts than on the prairies. It is believed that similar systems contribute significantly to precipitation totals in the Liard Basin climatic region and along the east to north slopes of main interior mountain ranges. Synoptic scale lows with well developed centres to the 50-kPa level create heavy rainfall which can be modified by topography; an example of such a system that gave 28.4mm of rain to Whitehorse on 5 August, 1974 is shown in Figure 9.4. It should be noted that although prevailing upper winds in Yukon are generally westerly, winds from other quadrants in individual storms contribute to orographic precipitation. In fact, most of the highest precipitation amounts in the Yukon interior occur with upslope northerly or easterly winds associated with synoptic scale systems (section 12).

Most of the major interior mountain barriers of Yukon such as the Ogilvie, Selwyn and Mackenzie Mountains are broad, yet consist of a complex series of parallel ranges rather than a single height of land. There is evidence that precipitation increases with elevation on either side of these barriers, but some interior secluded valleys or plateaux may show marked decreases in total precipitation.

A detailed study of precipitation data for Mayo-Elsa and Faro-Anvil indicated that in these areas there is an increase in precipitation of approximately eight percent for roughly each 100m increase in elevation. This result may not apply in other areas of Yukon. Extrapolation of precipitation data should only be utilized between adjacent locations with similar slope, aspect, orientation and degree of shelter. It is believed that precipitation in Yukon generally increases with height to about the 1500m to 2000m level then gradually decreases with elevation.

Although total precipitation generally increases with elevation, rainfall-intensity (how much over a specified time) does not always increase with elevation. In fact at Marmot Creek, a study of data from three sites in this basin showed the opposite relationship (Janz and Storr, 1977). It showed a rapid decrease of intensity with elevation for short-period rainfalls (5, 10, 15, 30, and 60 min, and 2 and 6 hr durations) that becomes practically zero change for a 12-hour duration and a slight increase for the 24-hour falls. No such study has been undertaken for Yukon but similar conditions could apply since the cause is believed to be related to topography and/or the rainfall-producing mechanism.

Short-duration high-intensity rainfall is usually caused by cumulonimbus cloud. In such cloud most of the precipitation is generated between the base and about a kilometre or so above the freezing level and in single clouds the main source moisture is entrained between the ground and the cloud base. The distance between the ground and the cloud base as well as the freezing level is less in mountainous terrain of the Cordillera than over the prairies and eastern Canada where the most severe thunderstorms occur. Thunderstorm occurrence increases but intensity usually decreases with elevation.

Convective clouds are steered by the mean windflow which in turn is modified by terrain. It may be that the core of a cumulonimbus rain area where the precipitation is most intense is steered away from the higher elevations on a given slope to create the decrease in short-period rainfall-intensity noted in the Marmot Creek basin. Janz and Storr (1977) discuss several aspects of the precipitation-topography relationship, many of which apply to Yukon.

9.3 Mean Precipitation

As mentioned in section 9.1, most of the precipitation falls from June to December with lower elevations receiving a maximum from summer convective cloud systems, and higher locations showing two maxima – one in summer and a second in the fall and early winter. The latter is mainly due to synoptic scale systems.

The annual and monthly total precipitation patterns over Yukon are depicted in Figures 9.5 to 9.17. It should be noted that the isohyets are estimates only with no precise extrapolative or interpolative value (section 4.2.2). The isohyets generally show the influence of elevation on precipitation totals as the maxima and minima are aligned with the general topography. For example, the pattern of annual total precipitation (Figure 9.5) shows the highest values on the Pacific slope then the rain shadow at Carcross due to the Coast Mountains and at Kluane Lake due to the St. Elias Mountains. Precipitation increases again over the Pelly-Cassiar Mountains then decreases in the relatively narrow northwest-southeast zone along the Rocky Mountain Trench, the Liard Plain (near Watson Lake), and in the Tintina Trench (Ross River). The maxima in the east and north generally coincide with the Mackenzie-Ogilvie block and the Richardson-British Mountain ranges respectively. The precipitation-elevation relationship is quite consistent from month-to-month.

April usually has the least precipitation with large areas in all basin regions except the Liard with less than 10mm. On the Liard plains totals are under 20mm. The least is on the north coast with less than 5mm at Komakuk Beach. Maximum values in this month of over 40mm are found over the southern Selwyn Mountains with even higher values in the St. Elias Mountain region (Figure 9.9).

July is generally the wettest month, particularly at low elevations, and there is a notable maximum over the Mackenzie-Selwyn Mountains (Figure 9.12). Values in the south range from less than 30mm around Carcross to more than 90mm in the southern highlands of Kluane National Park, over the Mackenzie-Selwyn-Wernecke Mountains, and over a small isolated area near the border southwest of Dawson. In the north values drop to near 20mm at Old Crow and on the north coast. Over twice as much precipitation falls in July as in April. It is noted that July is not the wettest month at some high country stations; for example, at Swift River (Figure 8.40) and Tuchitua (Figure 8.42) there is as much or more precipitation in some winter months.

There are some significant changes in the month-to-month patterns. For example, in the fall and winter the amounts over the Pelly-Cassiar region are in some months greater than over the Mackenzie-Selwyn Mountains. This is due to the proximity of storm tracks and cyclogenesis rather than elevation-related (chapter 12).

Mean monthly total precipitation and the greatest precipitation in 24 hours for each month are displayed for 25 stations in Figures 8.20 to 8.44. The contrasting patterns discussed in section 9.1 are again evident as shown by the mean monthly totals for Snag (Figure 8.39), a continental lowland pattern, and the highland fall-winter maximum at Swift River (Figure 8.40). Beaver Creek (Figure 8.22) and Boundary (Figure 8.23) have the highest monthly values in Yukon, 88.2mm and 89.3mm respectively. The lowest values of total precipitation in any month are on the Arctic coast with only 2.8mm at Komakuk Beach in March (Figure 8.34); over the interior, the lowest is 6.5mm at Carcross in April (Figure 8.25).

9.4 Extreme Precipitation

The greatest 24-hour precipitation amounts generally occur in summer, as shown at Aishihik (Figure 8.20), but there are notable exceptions like at Carcross (Figure 8.45) and Haines Junction (Figure 8.33) where peak values occur in the fall-winter months, and at Swift River in the Pelly-Cassiar climatic region, where 24-hour values are quite evenly distributed except for the generally dry spring period of April and May.

The ranges of annual 24-hour precipitation maxima are given in Table 9.1. Over the period of records, for liquid precipitation, the greatest 24-hour values range from the lowest for any year of 5.1mm at Old Crow to the highest value of 61.5mm at Boundary while values for frozen precipitation range from a low 24-hour maximum of 3.8mm at

Aishihik to a high 24-hour maximum of 37.0mm at Kluane lake. The values in the table are simply the lowest and the highest annual maximum 24-hour precipitation on record at a given station. Note that at most stations the greatest 24-hour fall is in the liquid form, the exceptions being Keno Hill, Klondike, Kluane Lake, Old Crow, Quiet Lake and Teslin, half of which are at high elevations.

9.4.1 *Probable Estimates of Extreme 24-hour Precipitation*

A Gumbel analysis was carried out on annual maximum 24-hour precipitation amounts for rainfall, snowfall, and total precipitation. The value for each year of record is utilized in such an analysis whereas only the highest and the lowest are given in Table 9.1.

The results of the analysis are given in Tables 9.2 to 9.4 and no values are shown for return periods longer than twice the length of the record. Again caution should be exercised in using these results, especially in those instances where the period of record is short. For a return period of 15 years, the most probable estimate of greatest 24-hour rainfall at Boundary is 73.0mm (expected to occur once in 15 years), the highest of the Yukon stations examined. For a 15 year return period, Boundary also has the highest estimated value for snowfall and total precipitation (Tables 9.3 and 9.4).

9.4.2 *Storm Rainfall*

The common synoptic pattern associated with wet weather is described in detail in chapter 12 and the importance of large low centres at the 50-kPa level in precipitation production was discussed in section 9.2. Stobbe (1975) described the rainstorm of 15-16 July, 1974, which washed out miles of the Alaska Highway and destroyed several bridge approaches – the worst storm in the history of the highway. Precipitation rates of 25mm/6hrs were recorded at Watson Lake and Dease Lake. The maximum total fall of over 100mm was estimated to have occurred over the Rockies southeast of Muncho Lake. The storm centre developed over the Peace River region then moved northwestward, intensifying on its way toward Ft. Nelson – a rather unusual track. Heavy thunderstorms preceded the onset of steady rain and cumulonimbus cloud was likely embedded in the system during its most active stage.

Bowkett (1974) described two storms that created heavy rainfall over the Mackenzie Mountains and large lows at 50-kPa were associated with both storms. The upper lows moved rapidly inland from the Gulf of Alaska across southern Yukon to capture their respective surface centres in the Mackenzie Valley. Although the main rainfall was on the east slopes of the Mackenzie Mountains, significant precipitation fell over southeastern Yukon. Summer rainstorms occur occasionally in northern Yukon as depicted in Figure 9.18.

9.5 **Precipitation Variability**

As mentioned in section 6.2, the climate of central Yukon is extremely variable. This holds true for precipitation particularly over central interior valleys where the climate is the most continental. For example, at Mayo the total rainfall in July has ranged from 9.1mm to 107.7mm. The standard deviations at some higher stations are quite low relative to valley locations indicating less variability with increasing elevation.

9.5.1 *Seasonal and Diurnal Variation of Precipitation Type*

The seasonal variability of total precipitation was discussed in section 9.1 and is depicted in Figure 9.1. Its type and frequency are certainly elevation dependent. The percentage of precipitation by type is given for selected stations in Table 9.5. Approximately 60% of precipitation at low levels is in the liquid form. The rainfall season is from mid-May to early October but it has rained in all months although seldom from January to March (at Dawson the form has been freezing rain). At higher elevations between 50 and 60% is in solid form and above 2500m almost 100% of precipitation is in solid form. Except for Komakuk Beach and Shingle Point on the Arctic coast, no station has had snowfall in July. Many record none in June, July or August.

Diurnal percentage frequency of liquid and frozen precipitation for Dawson and Whitehorse is illustrated in Figures 9.19 and 9.20, respectively. An analysis of data for other stations produced similar results so only two sample displays are included. Freezing precipitation is not shown since at no time did the frequency of occurrence at any hour exceed 0.2% and 90% of the time it was less than 0.1%.

Three things are readily apparent from this set of figures: firstly, at every station it snows more than twice as frequently as it rains (assuming, not too unreasonably, that all frozen precipitation is snow and all liquid, rain – for the sake of discussion); secondly, the diurnal variation of snow is much larger than that for rain (in fact there is no definitive pattern of frequency of occurrence for rain); thirdly, most stations show a maximum frequency of occurrence for snowfall in the morning between 0400 and 0900 and a snowfall frequency minimum in the afternoon between 1400 and 1800. The significance of more frequent occurrence of snow over rain is not great in terms of total precipitation because fresh snow has about one tenth the density of rain.

9.6 Duration of Precipitation

The frequencies of specified durations of precipitation by type for eight stations which report hourly precipitation are given in Tables 9.6 to 9.9. As an example, at Aishihik during the 13 years of precipitation records, May had 122 occurrences of rain: 112 of 6 hours or less, 8 of 7 to 12 hours duration, and 2 of 13 to 18 hours; the longest duration was 15 hours. There were also 147 occurrences of snow in those months of May, 126 of which were 6 hours or less and the longest was 27 hours. There was also one occurrence of freezing precipitation that was recorded at one hour.

The "curve" made by the numbers in themselves in the tables shows the general trend, through the year, for that particular precipitation element. The "spread" of the numbers (in the vertical) shows the monthly variability of precipitation durations, while the relative value of the number shows the percentage of occurrences in that duration class. For example, at Whitehorse (Table 9.9) during the 28 years of precipitation records for the month of May there were 426 occasions where it rained for 6 hours or less, 30 occasions of rain lasting 7 to 12 hours, and so on. The longest rain lasted 24 hours. In those same months there were 150 occurrences of snow of 6 hours or less, 15 of 7 to 12 hours. The longest snowstorm lasted 26 hours.

9.6.1 *Wet Spells*

The type of synoptic scale system that usually creates wet weather is designated as Type B in section 12.3 and others have been previously described in the present chapter. The most common wet spell is caused by a Type B pattern that persists for a prolonged period which is made up of a series of precipitation periods each due to an individual in a family of weather systems. For example, a major 50-kPa level low over Alaska and Yukon may have a series of short-wave troughs migrate around its periphery with clusters of showers or precipitating cloud systems associated with each trough.

A statistical analysis of such a series of precipitation producing systems is beyond the scope of this work. However, the duration of individual systems producing liquid, freezing, or frozen precipitation can be determined from Tables 9.6 to 9.9. Note that uninterrupted rainfall rarely exceeds 48 hours; of the eight stations examined only Burwash (Table 9.6) and Watson Lake (Table 9.9) have any in this category – 53 hours and 49 hours respectively. Periods of freezing precipitation are generally 6 hours or less with a few lasting up to 12 hours, but there was one extreme occurrence of 22 hours in February at Watson Lake (Table 9.9).

Continuous periods of snowfall of long duration occur more frequently than for all other types of precipitation. The longest uninterrupted period of the eight stations occurred at Burwash (Table 9.6) – 132 hours in January.

9.6.2 *Dry Spells*

The common feature of synoptic patterns associated with dry weather is a well developed ridge aloft stalled over Alaska. The extremes of this pattern create the cold as well as hot spells described in section 12.3 as Types C and D.

The frequency of periods in which consecutive days had no precipitation as well as the longest duration (dry period) for eight stations is given in Tables 9.10 and 9.11. Results are listed by months but it can be seen that individual dry spells can last longer than a month; one that began at Mayo in February lasted 100 days (Table 9.10). The greatest frequency of dry spells longer than a week (range 8 to 14 days and higher) generally occurs in the March to May period, particularly in April. Dry spells that occur in summer are associated with extreme maximum temperatures and very low relative humidity. Such a combination in June of 1969 created one of the most severe fire seasons on record.

9.6.3 *Short Duration Rainfall Intensity*

High rates of rainfall can cause extensive damage to roads, structures, etc. as mentioned regarding the July 1974 storm that devastated the Alaska Highway (section 9.4.2). In Yukon such rainfall is generally due to cumulonimbus cloud and associated heavy thunderstorms, except that on the marine slope of the St. Elias-Coast Mountains, the orographic rather than convective process may cause the lift. In either case instability cloud is no doubt involved. Some aspects of the rainfall intensity-elevation relationship were discussed in section 9.2.

Estimates of short-duration rainfall intensity-duration frequency for various return periods are given for selected stations in Figures 9.21 to 9.28. A reasonable record length of recording rain gauge data is required for such an analysis. Limited data were only readily available for eight locations in Yukon.

Estimated return period information is required in the design of water gathering/ drainage systems such as for large flat roofed buildings, storm sewers, urban parking lots, culverts, etc.. Note that estimates for return periods of 25, 50, and 100 years are, for most stations, unreliable due to the lack of long-term data; they should be treated with caution.

As an example, at Burwash (Figure 9.21) it is estimated that a 30-minute rainfall rate of 8mm/hr will occur once in 2 years (2 year return period) while the analysis estimates a 20mm/hr rate for 30 minutes will probably occur once in 100 years. Due to limited data, the results for 25, 50, and 100 years are suspect and are shown in dashed lines. An inspection of the 30-minute duration results for the eight stations shows that for a given return period the highest rate occurs at Dawson A where the climate is very continental in nature and some of the most intense thunderstorms in Yukon occur.

9.7 **Snow and Runoff**

Snow depths as well as snow cover advance and retreat over Yukon are discussed in general terms in section 6.1. Days with snow, seasonal and diurnal variations, and duration of frozen precipitation (snow) have been discussed previously in chapter 9. The greatest 24-hour total precipitation and means for winter months give a good indication of mean and extreme snowfall for individual stations (Figures 8.20 to 8.44). Expected annual maximum 24-hour snowfalls for various return periods are given in Table 9.3.

Mean snowfall patterns by months for one mountain location (Boundary) and four lower level stations from north to south are depicted in Figure 9.29. Komakuk Beach which receives the least snowfall of any station has the longest snow season and a maximum snowfall in October. Inland, at Old Crow, more snowfall occurs than on the north coast with a fall maximum as well as a secondary maximum in May. At Dawson and Whitehorse, the patterns are quite similar with the maximum moving into the early winter months. In the high country at Boundary two maxima are evident, separated by a low interval in January and February.

The late-winter to early-spring maximum shows up at other mountain region locations such as Keno Hill, Tuchitua and Swift River (Figure 9.30). At Watson Lake in the

Liard Basin a single maximum reaches its peak in December. The least snowfall at any interior station occurs at Kluane Lake, but it shows the main maximum in November and a secondary peak in April, somewhat similar in pattern to the high elevation locations. A scatter diagram for annual snowfall versus elevation for 30 Yukon stations is given in Figure 9.31 and a regression indicates a rough snowfall gradient of approximately 16cm/100m in elevation.

A number of long-duration recording precipitation gauge stations are in operation in remote areas of Yukon (Figure 4.2), but the records were not considered suitable for statistical analysis at the time of writing because of the short-term and discontinuous nature of most records. Snow course data are available from several watersheds and climatological stations as listed in Appendix C and some survey locations have been in operation in excess of 20 years; the network is depicted in Figure 4.2.

In order to illustrate the approximate snowpack gradient with elevation (mm, water equivalent) the long-term average totals on April 1 are plotted versus elevation for the three drainage basins with the greatest number of long-term records. It must be realized that the aspect, orientation and degree of shelter varies significantly from one survey area to another so these graphs indicate only general trends. In Figure 9.32, data on April 1 for 14 snow courses with records of 10 years or more in the Yukon River basin are plotted against elevation. A regression equation was developed which gives a first approximation of 5mm/100m for the snowpack gradient (water equivalent) with elevation. Note that the snowpack at Log Cabin has unique characteristics which make it stand apart from the rest.

In the Alsek River basin (Figure 9.33) the long-term averages are over periods of only 5 to 9 years, but the plot indicates a much larger gradient with elevation (27mm/100m) than in the Yukon basin. Canyon Lake and Bates River markedly oppose the general trend. In the Liard basin the data records are reasonably balanced and the snowpack gradient is about 21mm/100m (Figure 9.34).

Although snow radiates energy readily at the surface it has excellent insulating qualities as demonstrated by the igloo "climatic application". Winter is no doubt the most critical season for wildlife survival and snow is considered to be the most significant element, especially for land based species. Formozov (1946) studied the effects of snow cover and its impact on the ecology of mammals and birds, Many small mammals depend on the insulating qualities of the snowpack for winter survival. Snow insulating qualities decrease with increasing density so changes in snow characteristics are very important. Snow depth, hardness, as well as temperature and wind are important climatic parameters impacting on wildlife.

Stelfox and Tabler (1969) studied massive ungulate die-offs in the mountainous parks during severe winters. Ungulate mobility is noticably impaired when snow depth reaches two-thirds of the animal's chest height (Telfer and Kelsall, 1971). The action of the wind and rain or freezing rain can cause hardening of the upper portion of the snowpack into a crust. Sunshine, when it creates thawing temperatures (freeze-thaw cycles, section 8.8) can cause a hard crust. Snow crust can impede ungulate movement and in some cases cause leg injury. Grazing animals would naturally prefer no snow cover, and several authors (Kelsall, 1968 and Henshaw, 1968) have concluded that caribou and reindeer will not feed in snow depths greater than 50 to 80cm or when the density exceeds 0.50. More detailed discussion on the wildlife-climate relationship in mountainous terrain can be found in the work by Janz and Storr (1977).

Runoff in Yukon occurs mainly during the period May-October. June is generally the month with the highest runoff. Exceptions are those basins with large amounts of lake storage and those which have glaciers contributing a significant portion of the runoff. Hydrographs at gauging stations downstream from large lakes generally have one peak of long-duration which occurs later as compared to basins without lake storage. For example, the peak at Kluane River downstream from Kluane Lake occurs in August.

More erratic runoff characteristics occur on the Pelly, Stewart and Liard Rivers where multiple peaks of short-duration are common during the high runoff season. Generally the annual cycle of runoff reflects periods of high and low precipitation combined with temperature and storage effects. Hollingshead (1975) describes average runoff, flow variability, extreme flows and lake effects in Yukon.

There does not appear to be a very distinct spatial runoff pattern in Yukon. The main reason for this is probably due to the discontinuous nature of permafrost in the Territory. Runoff distribution certainly reflects the general precipitation pattern and both vary significantly with elevation.

Mean annual runoff values for the period of record up to 1982 (Water Survey of Canada, 1983) in the St. Elias Mountains and Selwyn Mountains are much higher than those reflected by precipitation measurements, particularly at valley stations. The average long-term runoff at the stream gauging station on the White River is 566mm while on the Kathleen River, near Haines Junction, the annual mean is 545mm. Both stations receive runoff from the east slopes of the St. Elias Mountains. Most precipitation measuring stations inland from these mountains record less than 300mm per annum. Peak runoff from the snow and ice fields on the St. Elias Mountains can create extreme flood conditions in the White and Donjek Rivers. On the other hand, glaciers on the Coast Mountains provide runoff into the Yukon River and Lake Laberge to aid water levels in July and August.

Mean annual runoff in the Hyland River and the Southern MacMillan River is 613mm and 604mm respectively. Both stream flow gauges are in the high precipitation zone of the southern Selwyn Mountains. In the far north, runoff values are 233mm at the Firth and 206mm at the Babbage River gauges. At the mouth of the Old Crow River the long-term average runoff is 112mm per annum. In southern Yukon a few stations in the basin south of Aishihik as well as near Tagish have average values from 70mm to 100mm. In general the annual runoff pattern reflects the same high and low areas as shown in the annual precipitation pattern depicted in Figure 9.5.

The sudden rise in water levels in May can naturally aid break-up of winter ice cover. On the other hand ice jamming is a major cause of flooding problems in Yukon. In the early life of Marsh Lake dam, artificial control of the water level was utilized to create downstream an unnaturally early break-up to lengthen the river transportation season by a few weeks. Since the mid-fifties this dam has been a control unit for the Whitehorse Rapids hydroelectric system. Winter flow in this system can be insufficient to operate the Whitehorse Rapids plant at maximum capacity. It is therefore necessary to maximize impoundment at Marsh Lake, but if stream flow forecasting is inadequate the lake may flood shoreline properties, as recently occurred (Jancowicz, 1984).

Both regional and site specific precipitation data are required for proper design of hydroelectric developments. A recent assessment of the Aishihik dam has shown long term inflow to be 82% of that projected (Jancowicz, 1984). Operation of the plant has resulted in Aishihik Lake being drawn down to almost its minimum licensed level. The lack of real data from the collection basin likely contributed to this problem.

9.8 Mean Precipitation Change

The year-to-year total precipitation amounts and the corresponding 10-year running means for 11 stations are shown in Figures 9.35 to 9.45. The mean for the period of record and the standard deviation are also shown on each figure. It is evident that a fairly large year-to-year variability exists at most stations. This variability is reflected in coefficients of variation (C.V.) which range from a low of 12.8% at Aishihik to a high of 41% at Komakuk Beach. Three of the stations have C.V.'s of less than 15%, and three greater than 20%.

The ten-year running means show the difficulty in ascertaining any real trend to the precipitation pattern; Aishihik, Burwash and Watson Lake show a decrease in precipitation. So does Fort Franklin but a slight recovery in the later years almost brings the curve back to its original height. Haines Junction, Johnson's Crossing, Snag, and Komakuk Beach all show significant increases, particularly in the past 20 years. Precipitation at Whitehorse decreased slightly in the 1950's but recovered in the 1960's and has remained fairly level in the last 10 to 15 years. Mayo's precipitation also dipped in the 1950's but increased even more in the 1960's and remained at a higher level. Teslin's has been up and down but is much the same today as it was in the late 1940's.

TABLE 9.1

Range of Annual 24-Hour Precipitation Maxima

STATION	RAIN		SNOW		TOTAL	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
Aishihik	34.5	10.9	14.2	3.8	34.5	10.9
Anvil	36.8	10.2	21.3	10.2	36.8	12.6
Beaver Creek	36.8	17.8	19.6	7.9	36.8	9.0
Boundary	61.5	10.9	31.5	12.2	61.5	12.2
Braeburn	21.0	7.9	11.0	8.0	21.0	13.0
Burwash	38.4	10.7	22.9	5.2	38.4	14.7
Carcross	36.8	11.8	15.2	8.9	36.8	12.0
Carmacks	23.6	9.4	15.0	4.1	23.6	10.4
Clinton Creek						
Dawson	52.8	7.6	29.5	4.1	52.8	7.6
Drury Creek	30.7	12.0	27.9	7.6	30.7	13.5
Elsa	45.7	14.2	18.3	9.4	45.7	15.0
Faro	46.7	12.2	16.3	6.6	46.7	12.2
Fort Selkirk	34.8	9.1	20.8	5.8	34.8	9.1
Haines Junction	58.4	8.6	30.0	4.6	58.4	9.1
Johnsons Crossing	27.9	12.2	21.3	7.6	27.9	12.2
Keno Hill	25.1	13.2	26.4	10.2	26.4	14.0
Klondike	22.9	12.7	23.4	13.7	23.4	13.7
Kluane	29.8	15.7	37.0	7.6	37.0	16.6
Komakuk	44.5	5.1	15.2	4.1	44.5	7.6
Mayo	29.2	8.9	24.9	6.6	29.2	9.9
Old Crow	21.6	5.1	25.4	8.1	22.9	15.5
Quiet Lake	17.8	16.8	21.6	20.3	21.6	20.3
Ross River	27.9	9.2	12.7	5.4	27.9	14.2
Shingle Point	56.6	7.6	18.8	5.2	56.6	7.6
Snag	51.8	9.1	21.1	6.6	51.8	15.2
Swift River	37.6	11.2	31.8	12.7	37.6	12.7
Teslin	28.2	8.1	33.5	7.6	33.5	10.7
Tuchitua	32.5	11.3	28.7	10.7	32.5	13.0
Watson Lake	46.4	10.4	27.7	9.4	46.4	13.5
Whitehorse	30.7	9.1	27.2	7.6	30.2	9.1

TABLE 9.2

Expected Annual Maximum 24-Hour Rainfall (mm) for Various Return Periods

STATION	2	5	10	15	20	25	30	50	100
Aishihik	17.2	26.5	32.6	36.1	38.5	40.4	41.9	46.2	
Anvil	17.7	26.6	32.6	35.9	38.2	40.1			
Beaver Creek	26.7	36.0	42.4	45.7	48.1				
Boundary	26.1	49.6	64.5	73.0					
Braeburn	15.2	20.4	23.9	25.9					
Burwash	22.0	30.6	36.3	39.5	41.7	43.5	44.9		
Carcross	18.6	31.6	40.3	45.2	48.6	51.3	53.4	59.4	67.4
Carmacks	14.3	18.1	20.6	22.1	23.1	23.9	24.5		
Dawson	19.6	29.7	36.4	40.2	42.8	44.9	46.5	51.2	57.4
Drury Creek	17.8	24.1	28.3	30.7					
Elsa	19.8	29.1	35.3	38.8	41.3	43.1	44.7		
Faro	22.1	40.5	52.6						
Fort Selkirk	17.5	24.8	29.6	32.3	34.2	35.7	36.9	40.2	
Haines Junction	19.0	32.0	40.6	45.4	48.8	51.5	53.6	59.5	
Johnsons Crossing	17.6	22.7	26.2	28.1	29.5	30.5	31.3		
Keno Hill	19.3	26.1	30.7	33.2					
Klondike	15.7	20.0	22.9	24.5					
Kluane	20.6	26.8	30.9	33.2	34.9				
Komakuk	14.5	26.0	33.6	37.9	40.9	43.2	45.1	50.3	
Mayo	16.9	22.7	26.5	28.6	30.1	31.3	32.2	34.9	38.4
Old Crow	14.3	22.1	27.3	30.2	32.2	33.8	35.1		
Quiet Lake	17.3	18.4							
Ross River	17.2	22.8	26.5	28.6	30.1	31.2			
Shingle Point	20.1	31.8	39.5	43.9	46.9	49.3	51.2	56.5	
Snag	27.2	39.6	47.8	52.5	55.7	58.2	60.3	66.0	
Swift River	21.2	28.6	33.5	36.2	38.2	39.6	40.8		
Teslin	15.7	21.3	25.0	27.1	28.6	29.7	30.6	33.2	
Tuchitua	22.0	28.8	33.3	35.8	37.6	38.9	40.0		
Watson Lake	20.6	29.8	35.9	39.4	41.8	43.7	45.2	49.4	
Whitehorse	15.0	20.7	24.3	26.5	27.9	29.2	30.2	33.0	

TABLE 9.3

Expected Annual Maximum 24-Hour Snowfall (cm) for Various Return Periods

STATION	2	5	10	15	20	25	30	50	100
Aishihik	9.2	12.7	15.0	16.3	17.2	17.9	18.5	20.1	
Anvil	12.6	16.3	18.8	20.2	21.1	21.9			
Beaver Creek	12.7	17.5	20.6	22.4	23.6				
Boundary	19.6	29.5	36.1	39.8					
Braeburn	9.5	10.8	11.7	12.2					
Burwash	11.8	17.4	21.1	23.2	24.7	25.8	26.7		
Carcross	11.0	14.2	16.2	17.4	18.3	18.9	19.4	20.8	22.8
Carmacks	8.7	12.5	15.0	16.4	17.4	18.2	18.8		
Dawson	11.9	17.3	20.8	22.8	24.2	25.3	26.1	28.6	31.9
Drury Creek	16.0	23.0	27.7	30.3					
Elsa	11.8	14.5	16.4	17.4	18.2	18.7	19.2		
Faro	10.2	15.3	18.7						
Fort Selkirk	10.1	13.4	15.6	16.8	17.7	18.3	18.9	20.4	
Haines Junction	16.4	24.3	29.5	32.5	34.6	36.2	37.5	41.1	
Johnsons Crossing	11.9	16.0	18.7	20.2	21.3	22.1	22.7		
Keno Hill	17.1	24.5	29.4	32.2					
Klondike	18.7	22.2	24.5	25.9					
Kluane	13.8	27.4	36.4	41.5	45.1				
Komakuk	8.1	11.5	13.8	15.1	16.0	16.7	17.3	18.9	
Mayo	11.6	15.6	18.3	19.8	20.8	21.7	22.3	24.2	26.6
Old Crow	15.7	23.6	28.8	31.8	33.9	35.5	36.8		
Quiet Lake	20.9	22.4							
Ross River	8.1	11.7	14.1	15.4	16.4	17.1			
Shingle Point	8.8	12.5	14.9	16.3	17.3	18.0	18.6	20.3	
Snag	13.3	18.3	21.5	23.3	24.6	25.6	26.4	28.7	
Swift River	19.4	25.3	29.1	31.3	32.9	34.0	35.0		
Teslin	13.2	20.1	24.7	27.3	29.1	30.5	31.6	34.8	
Tuchitua	15.4	21.3	25.1	27.3	28.8	30.0	31.0		
Watson Lake	16.1	21.7	25.4	27.5	28.9	30.1	31.0	33.5	
Whitehorse	11.1	16.8	20.6	22.7	24.2	25.3	26.3	28.9	

TABLE 9.4

Expected Annual Maximum 24-Hour Total Precipitation (mm) for Various Return Periods

STATION	2	5	10	15	20	25	30	50	100
Aishihik	18.0	27.2	33.2	36.6	39.0	40.8	42.3	46.5	
Anvil	18.3	27.0	32.7	36.0	38.3	40.0			
Beaver Creek	26.7	36.0	42.1	45.6	48.0				
Boundary	35.3	56.9	71.1	79.2					
Braeburn	15.6	20.1	23.1	24.8					
Burwash	22.7	30.8	36.2	39.2	41.3	42.9	44.2		
Carcross	18.6	31.6	40.3	45.1	48.6	51.2	53.3	59.3	67.3
Carmacks	14.6	18.2	20.5	21.8	22.8	23.5	24.1		
Dawson	20.4	30.4	37.0	40.7	43.4	45.4	47.0	51.6	57.7
Drury Creek	20.3	26.2	30.1	32.3					
Elsa	20.5	29.4	35.4	38.7	41.1	42.9	44.3		
Faro	22.4	40.6	52.6						
Fort Selkirk	17.5	24.8	29.6	32.3	34.2	35.6	36.8	40.1	
Haines Junction	22.0	34.9	43.5	48.3	51.7	54.3	56.4	62.3	
Johnsons Crossing	18.3	23.1	26.2	28.0	29.3	30.3	31.0		
Keno Hill	19.9	27.1	31.9	34.6					
Klondike	19.3	23.2	25.8	27.3					
Kluane	23.9	33.0	39.0	42.4	44.8				
Komakuk	16.5	27.5	34.7	38.9	41.7	43.9	45.8	50.8	
Mayo	17.5	23.0	26.6	28.6	30.0	31.1	32.0	34.5	37.8
Old Crow	19.5	23.2	25.6	26.9	27.9	28.6	29.2		
Quiet Lake	20.9	22.4							
Ross River	18.1	23.1	26.4	28.3	29.6	30.6			
Shingle Point	20.9	32.2	39.7	43.9	46.9	49.2	51.1	56.2	
Snag	28.6	39.3	46.4	50.4	53.2	55.3	57.1	62.0	
Swift River	23.5	31.4	36.6	39.5	41.6	43.1	44.4		
Teslin	17.5	23.2	27.0	29.2	30.6	31.8	32.7	35.3	
Tuchitua	23.5	29.5	33.5	35.8	37.3	38.6	39.5		
Watson Lake	22.4	31.1	36.9	40.1	42.4	44.1	45.6	49.5	
Whitehorse	15.8	21.3	24.9	27.0	28.4	29.6	30.5	33.0	

TABLE 9.5

Percentage of Precipitation by Type

STATION	TOTAL PRECIP. (mm)	% RAIN	% SNOW	STATION	TOTAL PRECIP. (mm)	% RAIN	% SNOW
Aishihik	256.3	63.2	36.8	Keno Hill	590.2	40.9	59.1
Anvil	367.7	45.4	54.6	Klondike	468.7	46.7	53.3
Beaver Creek	377.8	67.4	32.5	Kluane	223.9	75.4	24.6
Boundary	580.5E	53.9	46.1	Komakuk	135.9	55.8	44.2
Braeburn	259.6	59.7	40.1	Mayo	306.3	60.4	39.6
Burwash	301.0	60.5	39.5	Old Crow	214.7	50.3	49.7
Carcross	211.4	56.1	43.9	Quiet Lake	M	M	M
Carmacks	254.3	62.0	38.0	Ross River	263.5	57.7	42.3
Clinton Creek	370.4	57.4	42.6	Sheldon Lake	M	M	M
Dawson	182.7	61.2	38.8	Shingle Point	214.3	59.0	41.0
Drury Creek	349.4	52.3	47.7	Snag	338.5	61.9	38.1
Elsa	413.0	53.1	46.8	Swift River	582.1	40.5	59.5
Faro	287.7	55.9	44.1	Teslin	326.5	52.0	48.0
Fort Selkirk	286.4	59.3	40.7	Tuchitua	590.6	41.3	58.7
Haines Junction	292.5	53.9	46.1	Watson Lake	425.2	56.2	43.8
Johnsons Crossing	353.8	55.2	44.8	Whitehorse	261.2	55.7	44.3

TABLE 9.6

Frequency of Specified Duration of Precipitation

STATION: Aishikik 01/53 – 09/66

TYPE	LIQUID												FREEZING												FROZEN											
HRS DURAT. / MO.	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
1 to 6	1	1	2	13	112	317	330	284	141	32		2	4	4			1			1	2	2	1	4	193	167	168	147	126	24		5	50	179	165	190
7 to 12					8	23	33	35	18	3															50	49	39	20	16	1			11	37	50	49
13 to 18					2	6	6	6	5																13	28	20	9	2				6	10	18	24
19 to 24						3		3																	16	12	12	2	1				2	10	7	10
25 to 36						3	4	2	2																7	7	5	2	2				2	2	8	3
37 to 48							1																		6	3								3	3	4
>48																										2	1								2	2
Longest	1	1	3	6	15	27	42	29	33	8	0	2	4	3	0	0	1	0	0	4	1	2	3	1	46	75	49	30	27	10	0	2	28	45	63	87

STATION: Burwash 10/66 – 12/81

TYPE	LIQUID												FREEZING												FROZEN											
HRS DURAT. / MO.	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
1 to 6	4	2	1	11	169	333	368	257	140	32	5		1	4			1			1	1	8	2	2	176	135	124	140	82	8		9	49	136	204	229
7 to 12	1				12	36	42	45	21	3				1											72	46	37	32	22			2	9	36	64	28
13 to 18					4	9	14	6	8		1														34	17	15	15	2			1	5	24	30	15
19 to 24					2	1	4	2	2																10	9	6	4	2				4	13	16	11
25 to 36						1	1	2	2																11	7	11	3					1	5	13	1
37 to 48							1																		3	5	1						1	1	4	
>48						1																			2		1								4	
Longest	15	2	1	3	19	53	41	34	27	8	15	0	1	8	0	0	2	0	0	1	1	3	6	6	132	40	49	30	19	4	0	14	46	46	56	56

TABLE 9.7

Frequency of Specified Duration of Precipitation

STATION: Dawson 01/53 – 01/76

TYPE	LIQUID												FREEZING												FROZEN											
HRS DURAT. / MO.	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
1 to 6			7	58	310	463	512	519	355	103	8		5		2	1						14	13	9	385	389	240	190	43	2		4	45	412	471	488
7 to 12				1	19	27	34	35	35	14															75	69	55	25	4			1	9	73	85	71
13 to 18				2	5	4	5	1	10	1															26	24	10	8					1	23	37	38
19 to 24					2	3	2	3																	11	12	6	1					1	12	12	14
25 to 36						2		4	3	1															7	6	4							4	11	11
37 to 48																									4	6	2								1	4
>48																									2											
Longest	0	0	2	15	22	35	23	35	27	25	3	0	4	0	3	1	0	0	0	0	0	13	5	11	53	41	38	19	11	1	0	11	20	36	42	42

STATION: Mayo A 01/53 – 12/81

1 to 6	3	3	14	80	416	644	691	612	497	190	22	5	10	2	1	2						11	6	8	566	532	420	325	70			2	66	480	717	702
7 to 12			2	1	8	26	31	27	36	12			2												75	84	69	32	3				8	71	109	120
13 to 18				2	2	4	4	2	9	2															26	25	13	4					4	21	31	22
19 to 24					2	1		1	2																8	5	2	1						3	7	6
25 to 36					1	1			1																2	1	3							1	5	5
37 to 48									1																1											
>48																																			1	1
Longest	3	3	12	17	30	29	17	19	37	16	6	3	8	1	3	1	0	0	0	0	0	2	2	5	40	27	32	19	11	0	0	1	17	25	98	50

TABLE 9.8

Frequency of Specified Duration of Precipitation

STATION: Snag 01/53 – 09/66

TYPE	LIQUID												FREEZING												FROZEN											
HRS. DURAT. / MO.	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
1 to 6	2		7	10	209	344	384	296	154	28	3	2	5	1	2		2			2		5	5	3	141	126	91	117	76		1	3	44	166	132	166
7 to 12			1	1	17	23	31	25	18	4			2									1	1		69	58	43	29	9				7	38	41	57
13 to 18					3	8	20	15	7	1															31	23	29	9	3				6	19	24	23
19 to 24					1	5	4	6	9																16	7	7	6					1	11	13	13
25 to 36					2	3	3	1																	8	17	7	2						4	9	10
37 to 48								2																	4	3	6						1	3	8	9
>48																									5	4	1							2	6	3
Longest	1	0	10	7	31	35	46	46	24	15	5	4	7	5	3	0	2	0	0	3	0	7	7	5	109	77	71	34	16		1	3	39	63	102	98

STATION: Teslin 01/53 – 12/81

1 to 6	13	9	14	77	381	508	613	585	538	241	40	27	4									3	4	7	479	364	435	325	138	8		1	31	365	498	558
7 to 12			1	3	37	39	40	62	64	21	3													1	106	112	66	44	15				1	41	132	120
13 to 18					7	2	12	12	15	4															48	42	33	9						16	31	42
19 to 24						1	4	5	4																18	8	12						1	4	10	11
25 to 36					1	3	2	1	2																17	10	9	1					1	1	9	8
37 to 48									1																2	3	4	1							2	4
>48																									2	2									1	3
Longest	6	4	7	11	30	32	30	26	37	14	7	6	4	0	0	0	0	0	0	0	0	3	3	10	74	72	42	45	12	3	0	4	25	30	51	78

TABLE 9.9

Frequency of Specified Duration of Precipitation

STATION: Watson Lake A 01/53 – 12/81

TYPE	LIQUID												FREEZING												FROZEN											
HRS. DURAT / MO.	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
1 to 6	6	5	32	120	516	791	842	776	688	269	27	5	18	17	4	3						17	12	15	380	370	457	417	141	6			61	383	486	532
7 to 12			2	8	58	64	65	55	91	46	2		2									1		1	124	110	98	57	19				10	89	120	132
13 to 18					15	19	17	19	25	7	3														80	54	42	12	5				4	28	54	72
19 to 24				1	3	6	8	3	14	4	1			1											38	24	20	8	2				3	9	26	44
25 to 36					4	5	1	4	2	1															38	33	21	5					1	7	29	31
37 to 48					1	1	1	2																	19	15	8	1	1				1	6	11	20
>48								1																	21	17	13	2						1	18	13
Longest	6	2	8	23	37	47	37	49	36	26	21	6	10	22	4	1	0	0	0	0	0	12	3	8	128	118	81	80	37	5	0	0	40	83	114	98

STATION: Whitehorse A 01/53 – 12/81

1 to 6	25	18	19	79	426	660	819	706	620	290	56	31	5	3								7	9	14	402	367	310	312	150		9	5	77	294	441	453
7 to 12				6	30	41	55	71	70	19	4	1		1									1		127	103	80	56	15		1	2	11	84	134	142
13 to 18	1				5	11	21	15	25	1		1													86	50	47	23	2				2	31	49	74
19 to 24					3	2	6	10	5	2															48	28	19	6					3	15	33	39
25 to 36						3		4	2																34	27	16	5	1				1	10	25	30
37 to 48						1		1																	10	6	12						2	5	13	10
>48																									13	9	2							2	16	15
Longest	14	5	6	11	24	46	23	42	35	24	10	14	5	9	0	0	0	0	0	0	0	5	7	3	107	94	62	29	26	9	0	12	39	87	117	83

TABLE 9.10

Frequency of Specified Duration Ranges (days) with No Precipitation

STATION: Aishihik A 06/1943 – 09/1966

MONTH	RANGES (DAYS) 1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	75	27	20	2		16
FEBRUARY	68	22	9	6		29
MARCH	46	31	13	8	1	49
APRIL	28	24	13	10		27
MAY	45	28	20	5		27
JUNE	78	36	11	1		19
JULY	88	29	15	1		23
AUGUST	77	33	13	3		23
SEPTEMBER	56	23	26	4		20
OCTOBER	61	29	16	5		24
NOVEMBER	59	29	15	1		16
DECEMBER	75	25	21	3		20

STATION: Burwash A 10/1966 – 12/1983

MONTH	RANGES (DAYS) 1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	44	15	12	6	1	42
FEBRUARY	27	19	10	3	1	41
MARCH	22	10	18	5	2	36
APRIL	16	18	11	7	1	32
MAY	37	29	8		1	33
JUNE	59	23	8	2		15
JULY	56	28	6			11
AUGUST	55	19	8	4		24
SEPTEMBER	31	21	10	7	1	42
OCTOBER	46	12	14	5		21
NOVEMBER	59	22	9	2		29
DECEMBER	49	23	13	6		28

STATION: Dawson 07/1897 – 01/1979

JANUARY	230	93	44	16	3	33
FEBRUARY	180	84	48	15	3	68
MARCH	146	66	58	31	4	45
APRIL	97	61	52	31	4	41
MAY	198	83	50	15		26
JUNE	266	90	32	12	1	31
JULY	283	111	30	8		23
AUGUST	293	111	36	6		20
SEPTEMBER	261	99	50	13		29
OCTOBER	240	103	45	14		30
NOVEMBER	242	85	46	11		20
DECEMBER	244	95	44	14	3	40

STATION: Mayo A 06/1925 – 12/1983

JANUARY	147	55	35	19		29
FEBRUARY	114	59	34	12	5	100
MARCH	86	49	38	24	3	39
APRIL	74	52	46	24	1	42
MAY	154	79	35	7		28
JUNE	219	76	26	3		22
JULY	243	76	28	2		15
AUGUST	225	76	22	8		24
SEPTEMBER	193	70	38	6		29
OCTOBER	204	74	32	9	1	49
NOVEMBER	185	62	47	4		20
DECEMBER	184	55	37	16	1	63

TABLE 9.11

Frequency of Specified Duration Ranges (days) with No Precipitation

STATION: Snag A 08/1943 – 09/1966

MONTH	RANGES (DAYS) 1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	61	30	13	5		28
FEBRUARY	64	19	12	3	1	31
MARCH	48	29	11	7	1	44
APRIL	35	31	16	6	2	35
MAY	46	24	19	2		19
JUNE	96	22	7	1		25
JULY	99	21	6	2		18
AUGUST	81	31	15			14
SEPTEMBER	62	18	24	4	1	31
OCTOBER	52	27	10	7		30
NOVEMBER	67	28	17			12
DECEMBER	74	28	15	2		17

STATION: Teslin A 10/1943 – 08/1980

MONTH	RANGES (DAYS) 1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	147	43	15	4		21
FEBRUARY	121	48	16	2		18
MARCH	104	50	18	8		24
APRIL	86	40	38	6	1	37
MAY	97	53	21	6		27
JUNE	122	48	20	3		16
JULY	148	42	21	4		18
AUGUST	141	48	13	3		20
SEPTEMBER	141	32	20	1		15
OCTOBER	170	36	20	1		18
NOVEMBER	172	43	11			13
DECEMBER	169	35	12	2		23

STATION: Watson Lake A 10/1938 – 12/1983

MONTH	RANGES (DAYS) 1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	196	50	14	3		21
FEBRUARY	165	57	16	3		21
MARCH	133	56	25	6		28
APRIL	114	54	34	12		27
MAY	154	60	24	3		21
JUNE	175	61	13	2		17
JULY	201	56	14	4		17
AUGUST	177	52	17	4		22
SEPTEMBER	198	56	12	1		17
OCTOBER	216	56	19			14
NOVEMBER	214	46	11	1		15
DECEMBER	194	57	11	1		16

STATION: Whitehorse A 04/1942 – 12/1983

MONTH	RANGES (DAYS) 1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
JANUARY	174	51	22	2		16
FEBRUARY	119	49	25	5	1	35
MARCH	103	38	27	12	2	40
APRIL	65	36	29	18	3	49
MAY	57	39	26	16	1	32
JUNE	127	55	25	3		20
JULY	175	52	22	4		20
AUGUST	152	53	19	3		24
SEPTEMBER	141	51	24	6		20
OCTOBER	157	58	26	4		22
NOVEMBER	164	55	19	1		16
DECEMBER	181	55	17	3		17

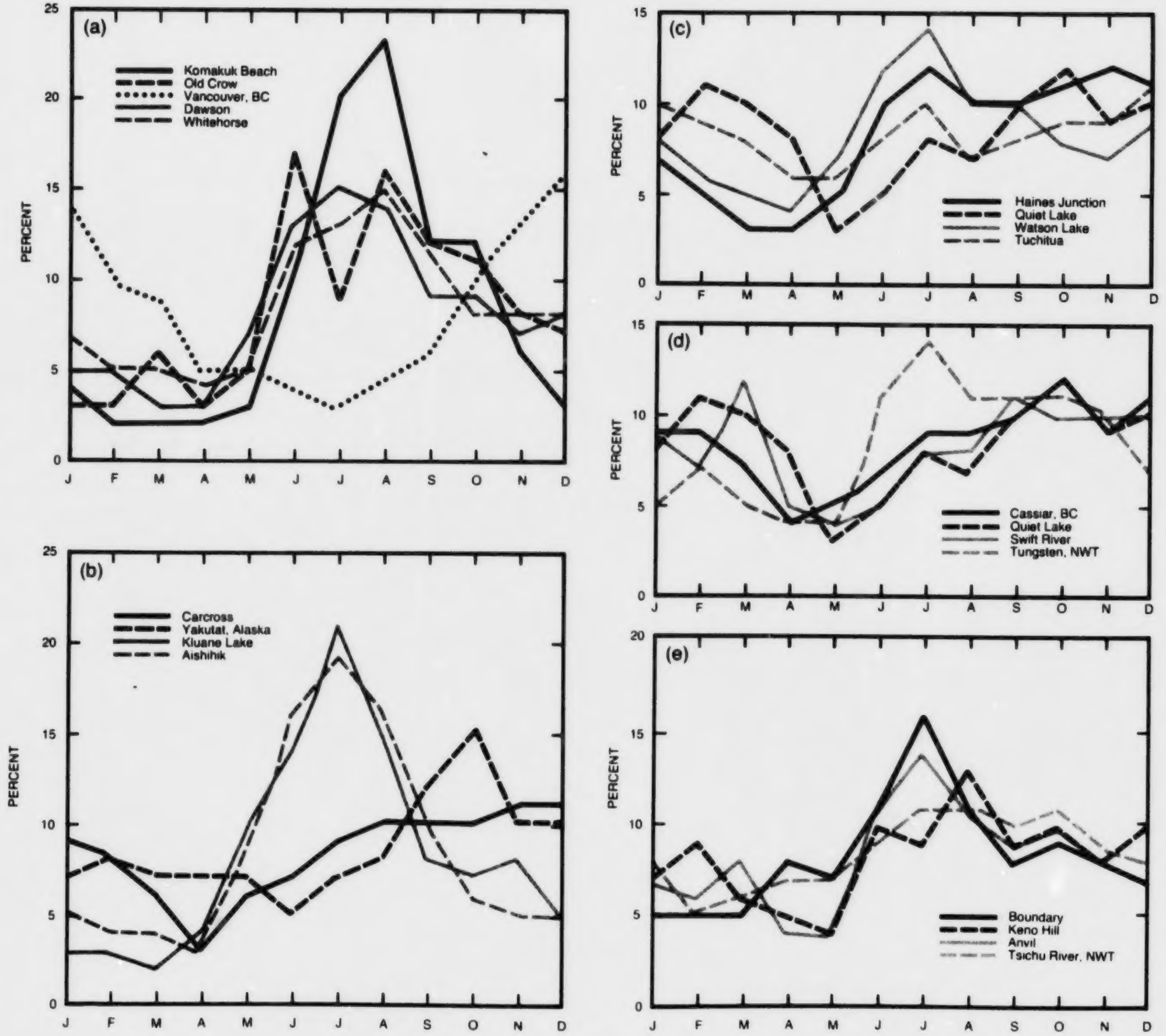


Figure 9.1 Mean monthly total precipitation (as a percentage of annual mean) for selected stations

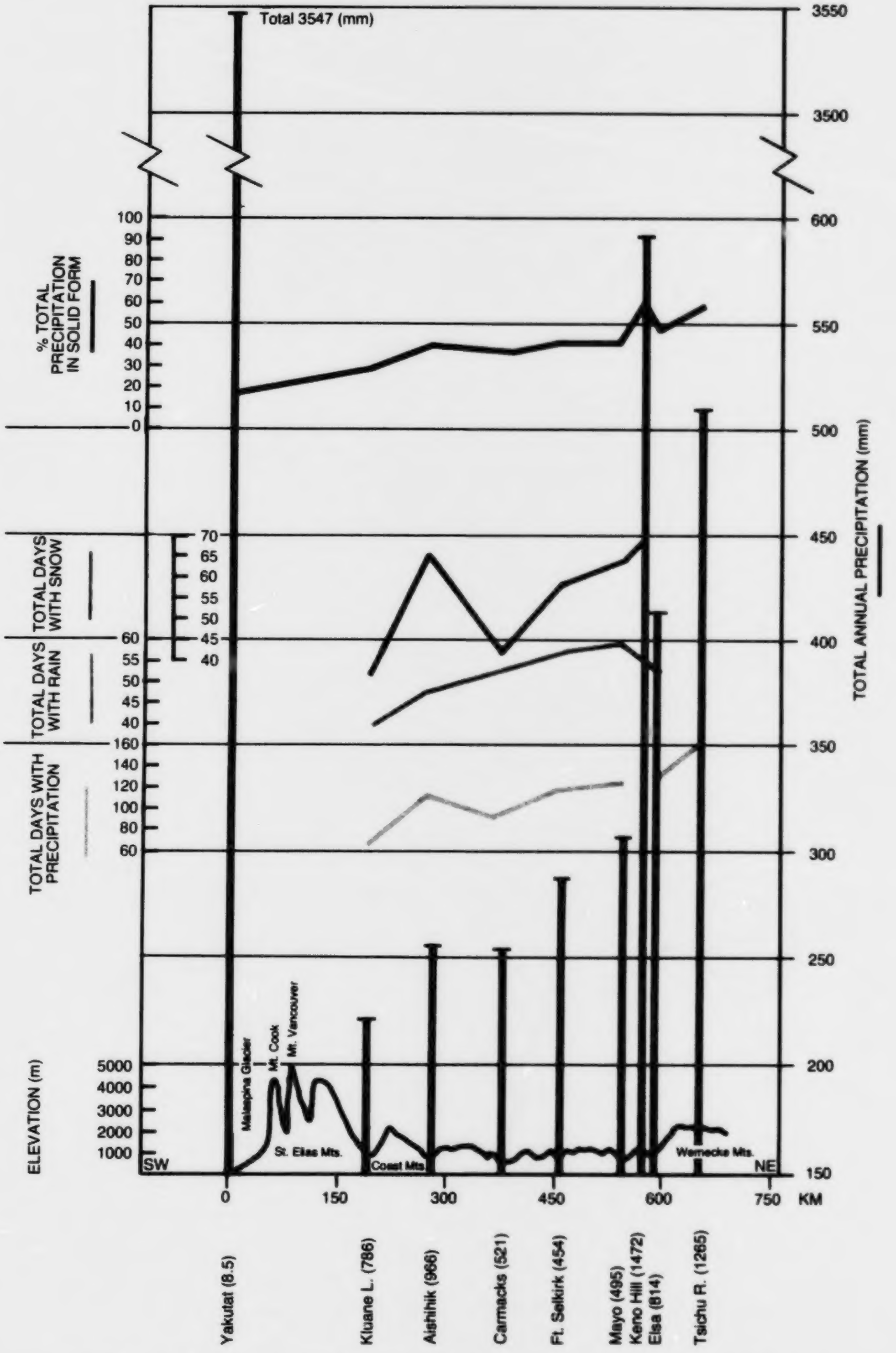


Figure 9.2 Precipitation-elevation relationships for selected stations on a southwest to northeast Yukon section

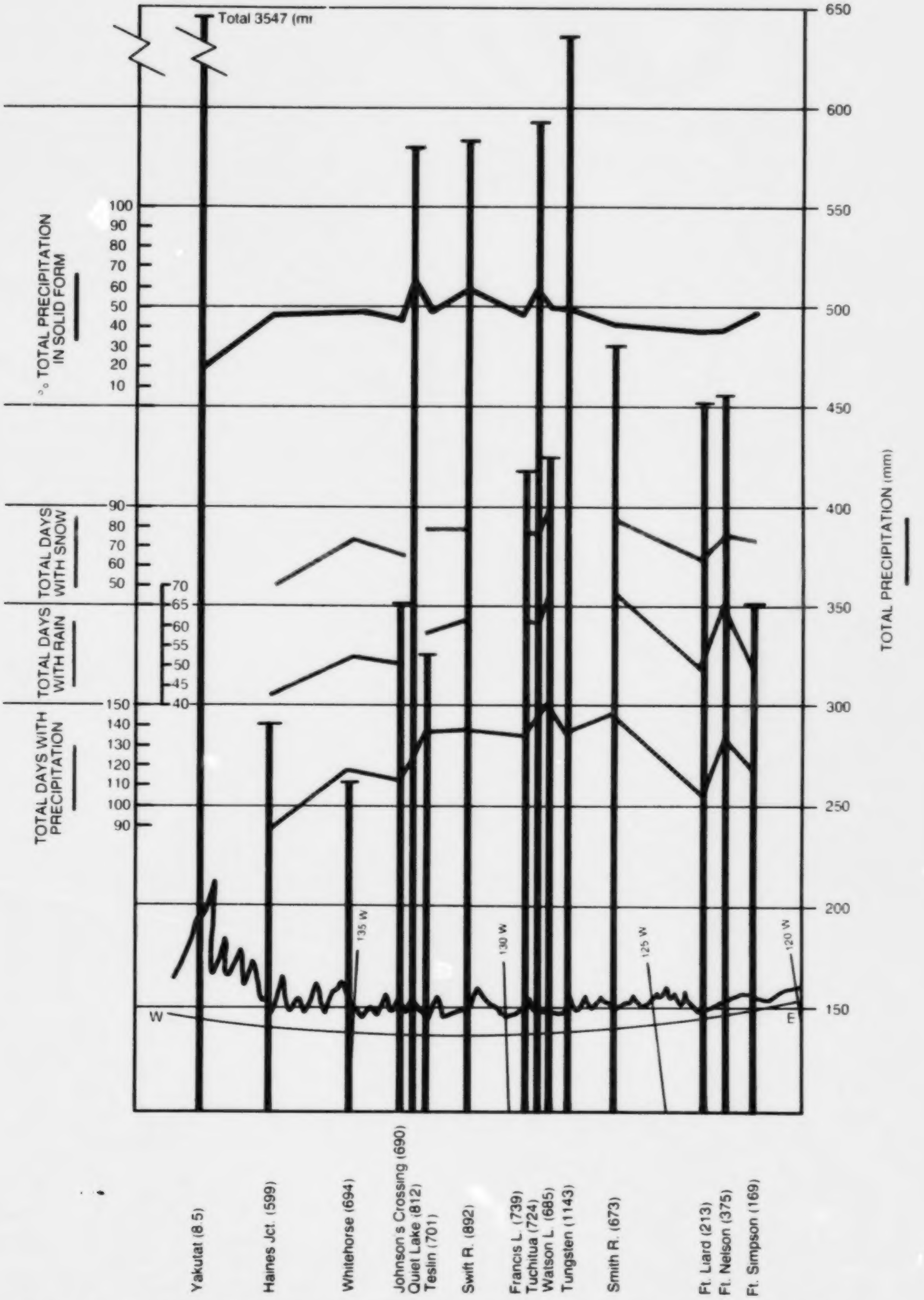


Figure 9.3 Precipitation-elevation relationships for selected stations near the 60th parallel in Yukon

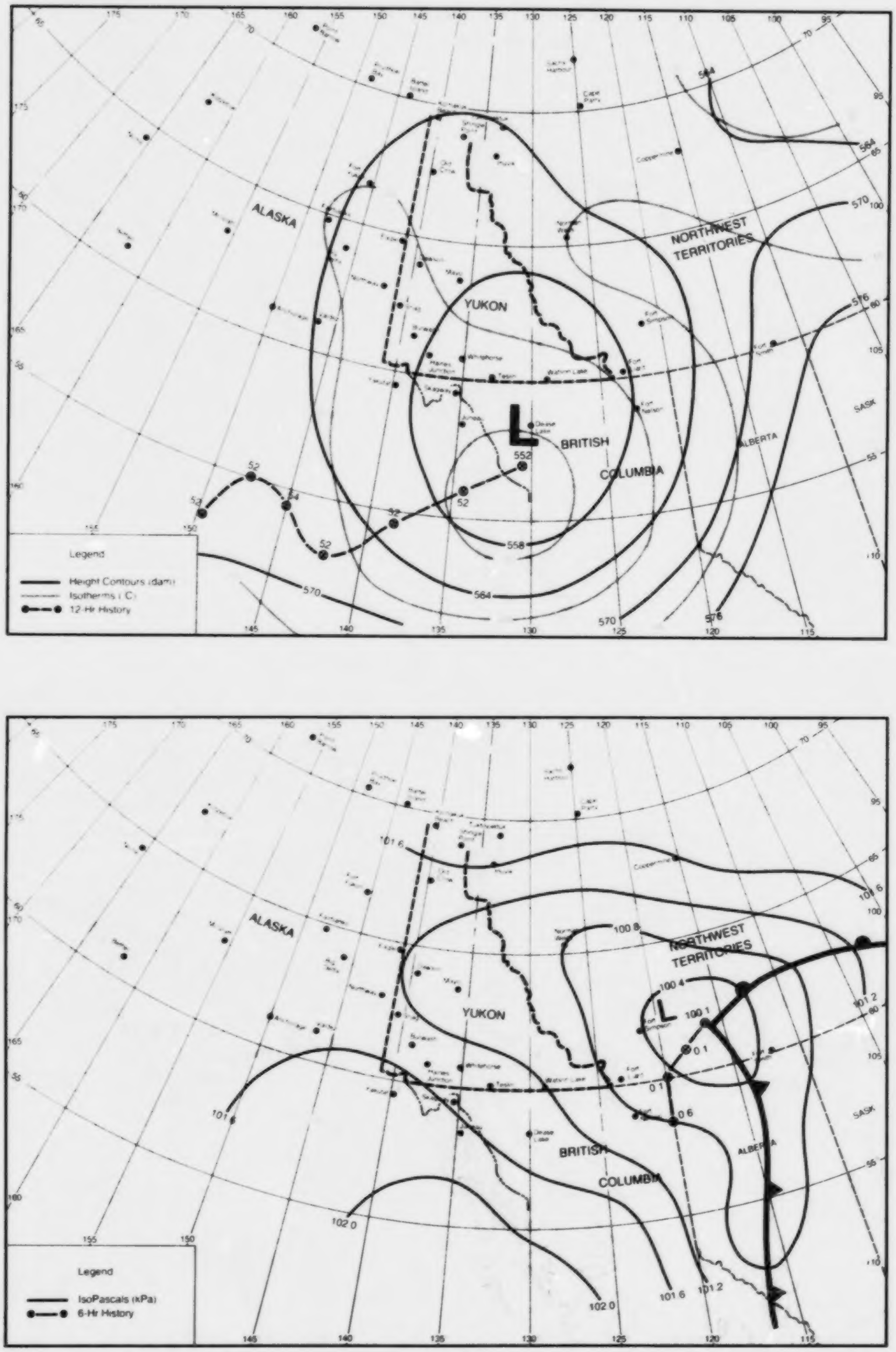

ALASKA
YUKON
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
SASK
L
552
558
564
570
576
52
54
Legend
Height Contours (dam)
Isotherms (°C)
12-Hr History
101.6
100.8
100.4
100.1
101.2
102.0
Legend
IsoPascals (kPa)
6-Hr History

Figure 9.4 50-kPa (a) and MSL pressure (b) patterns for 1200 GMT, August 5, 1974

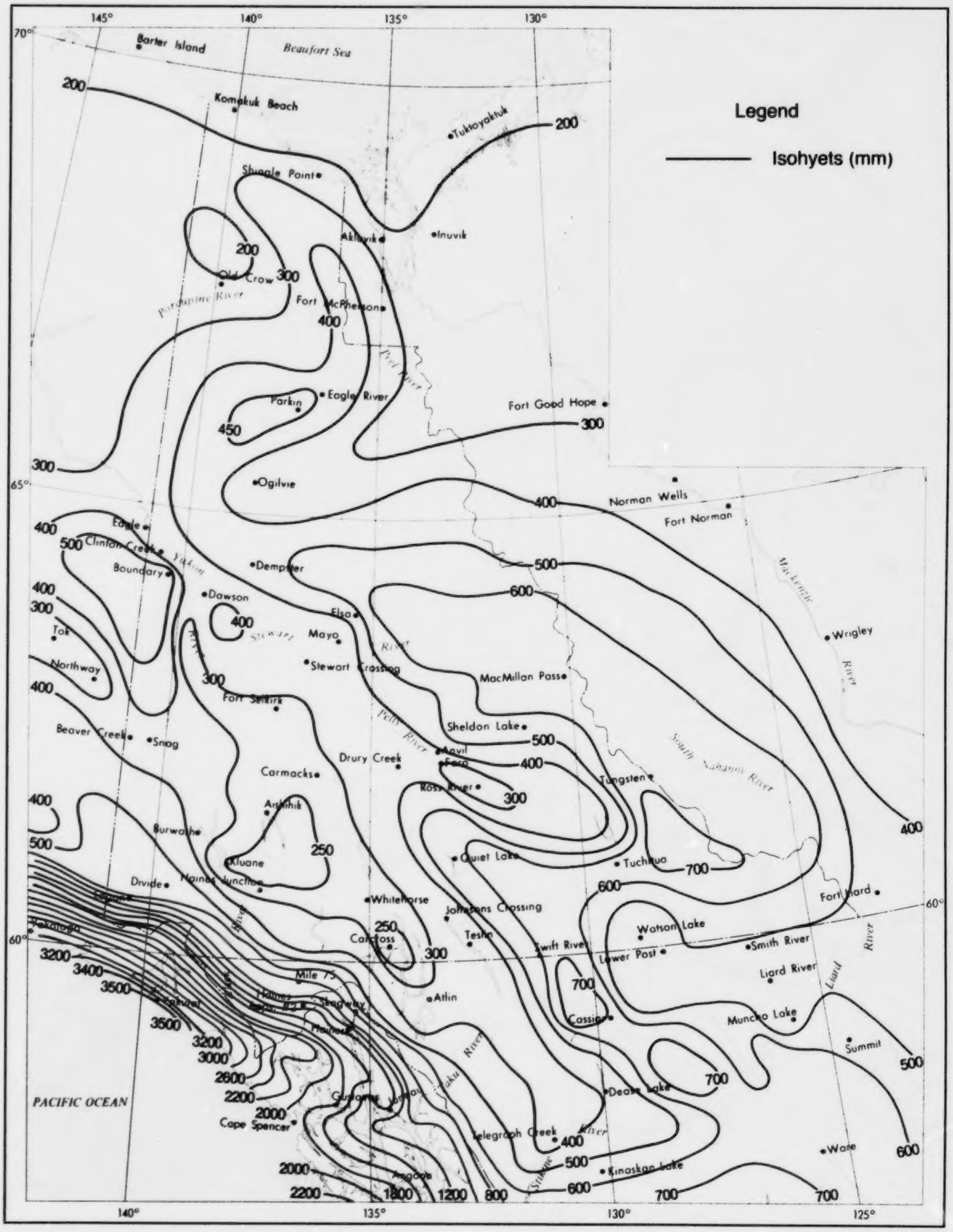

145°
140°
135°
130°
70°
65°
60°
125°
Legend
Isohyets (mm)
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Yukon
Dempster
Dawson
Elsa
Mayo
Stewart
Stewart Crossing
Tok
Northway
Fort Selkirk
MacMillan Pass
Mackenzie
Wrigley
River
Beaver Creek
Snag
Sheldon Lake
Pelly River
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
South Nahanni River
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Whitehorse
Johnsons Crossing
Fort Liard
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Liard
Mile 75
Haines
Skagway
Atlin
Cassiar
Muncho Lake
Summit
Taku River
Dease Lake
PACIFIC OCEAN
Cape Spencer
Juneau
Telegraph Creek
Stikine River
Kinaskan Lake
Ware
Angoon
Yakutat
200
300
400
450
500
600
700
250
800
1200
1800
2000
2200
2600
3000
3200
3400
3500

Figure 9.5 Annual mean total precipitation

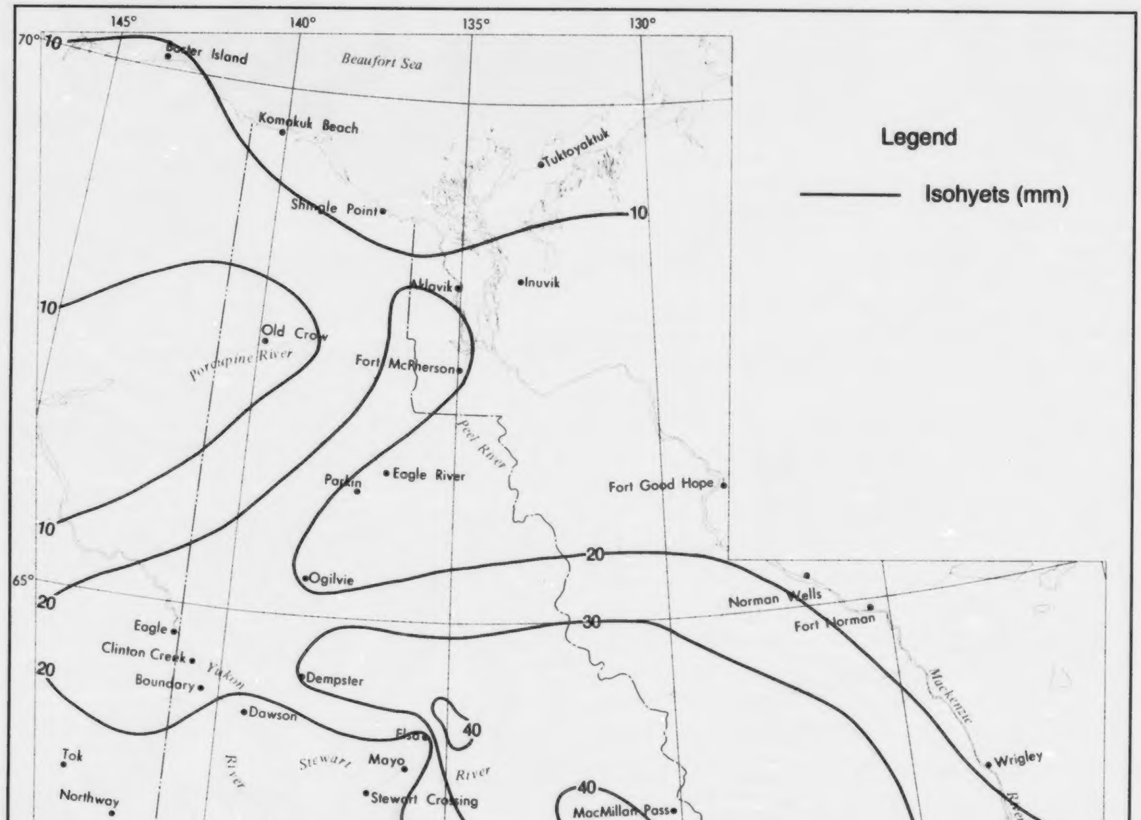

Legend
Isohyets (mm)
145°
140°
135°
130°
125°
70°
65°
60°
Beaufort Sea
PACIFIC OCEAN
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Yukon
Boundary
Dempster
Dawson
Elsa
Tok
Stewart
River
Mayo
Stewart Crossing
Northway
Wrigley
Mackenzie
MacMillan Pass
Fort Selkirk
Beaver Creek
Snag
Pelly River
Sheldon Lake
Anvil
Faro
Drury Creek
Carmacks
Ross River
South Nahanni River
Tungsten
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Teslin
Carcross
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Liard River
Mile 75
Haines Apps. #2
Skagway
Atlin
Yakutat
Haines
Cassiar
Muncho Lake
Summit
Taku River
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
Stikine River
Ware
Kinaskan Lake
Angoon
10
20
30
40
50
60
80
100
120
140
160
180
200
220
240

Figure 9.6 January mean total precipitation

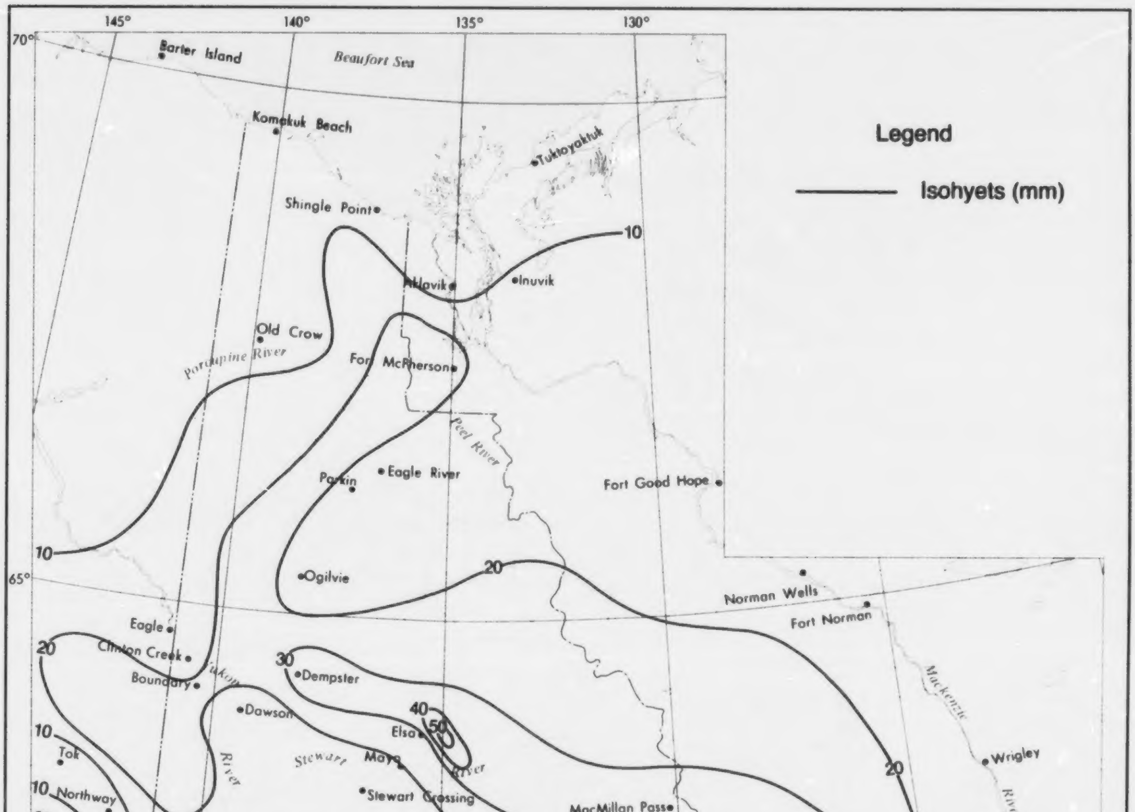

Legend
Isohyets (mm)
145°
140°
135°
130°
125°
70°
65°
60°
Beaufort Sea
PACIFIC OCEAN
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Yukon River
Dempster
Dawson
Elsa
Mayo
Stewart River
Stewart Crossing
Tok
Northway
Wrigley
Mackenzie River
MacMillan Pass
Fort Selkirk
Sheldon Lake
Pelly River
Anvil
Faro
Beaver Creek
Snag
Carmacks
Drury Creek
Ross River
Tungsten
South Nahanni River
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Whitehorse
Johnsons Crossing
Fort Liard
Teslin
Carcross
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Mile 75
Haines Apps. #2
Skagway
Haines
Yakutat
Atlin
Cassiar
Muncho Lake
Summit
Taku River
Dease Lake
Gustavus
Juneau
Cape Spencer
Telegraph Creek
Stikine River
Kinaskan Lake
Ware
Angoon
10
20
30
40
50
60
80
100
120
140
160
180
200
220
240
260
280

Figure 9.7 February mean total precipitation

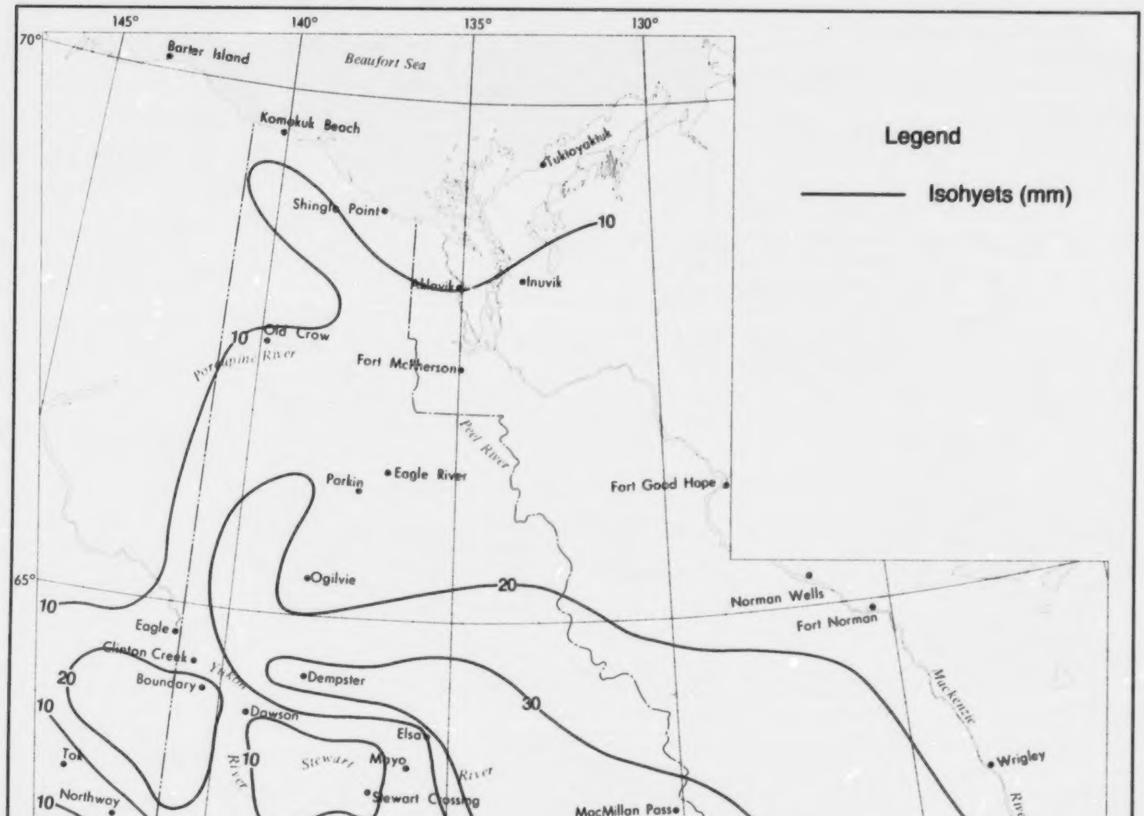

Legend
Isohyets (mm)
145°
140°
135°
130°
125°
70°
65°
60°
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Yukon
Boundary
Dempster
Dawson
Mackenzie
River
Elsa
Tok
Stewart
River
Mayo
Stewart Crossing
Wrigley
Northway
Fort Selkirk
MacMillan Pass
Beaver Creek
Snag
Pelly River
Sheldon Lake
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
South Nahanni River
Aishihik
Burwash
Quiet Lake
Kluane
Tuchitua
Divide
Haines Junction
Lapan
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Watson Lake
Carcross
Teslin
Swift River
Lower Post
Smith River
Liard River
Liard
Mile 75
Haines
Apps #2
Skagway
Atlin
Yakutat
Haines
Muncho Lake
Summit
Cassiar
PACIFIC OCEAN
Gustavus
Juneau
Taku
River
Dease Lake
Cape Spencer
Telegraph Creek
River
Stikine
Ware
Angoon
Kinaskan Lake
10
20
30
40
50
60
70
80
90
100
110
120
130

Figure 9.8 March mean total precipitation

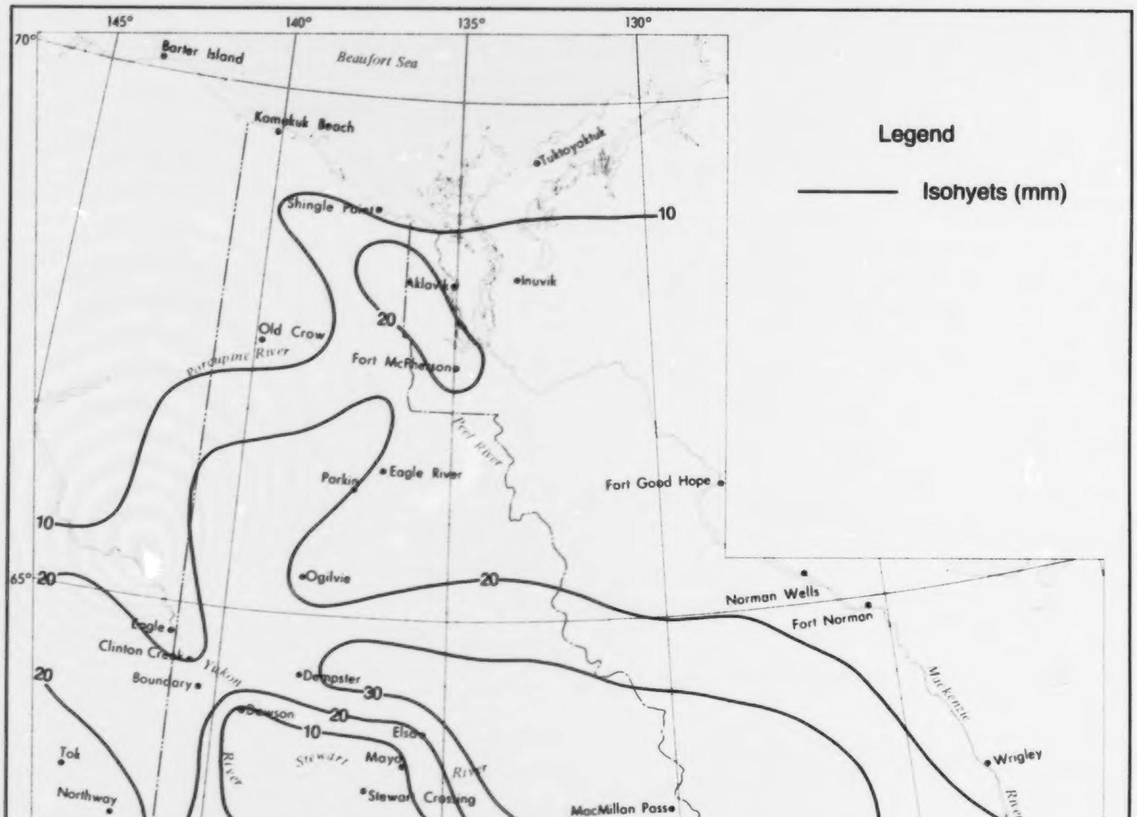

Legend
Isohyets (mm)
145°
140°
135°
130°
125°
70°
65°
60°
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Eagle River
Porkin
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Yukon River
Dempster
Dawson
Elsa
Mayo
Stewart River
Stewart Crossing
Mackenzie River
Wrigley
Tok
Northway
MacMillan Pass
Fort Selkirk
Pelly River
Sheldon Lake
Beaver Creek
Snag
Anvil
Faro
Drury Creek
Ross River
Carmacks
South Nahanni River
Tungsten
Aishihik
Burwash
Quiet Lake
Tuchitua
Kluane
Haines Junction
Divide
Whitehorse
Johnsons Crossing
Fort Liard
Yakutat
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Mile 75
Haines Apps #2
Skagway
Haines
Atlin
Cassiar
Muncho Lake
Summit
Teslin River
PACIFIC OCEAN
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
Stikine River
Ware
Kinaskan Lake
10
20
30
40
50
60
70
80
90
100
150
159
170
180
200
210
230

Figure 9.9 April mean total precipitation

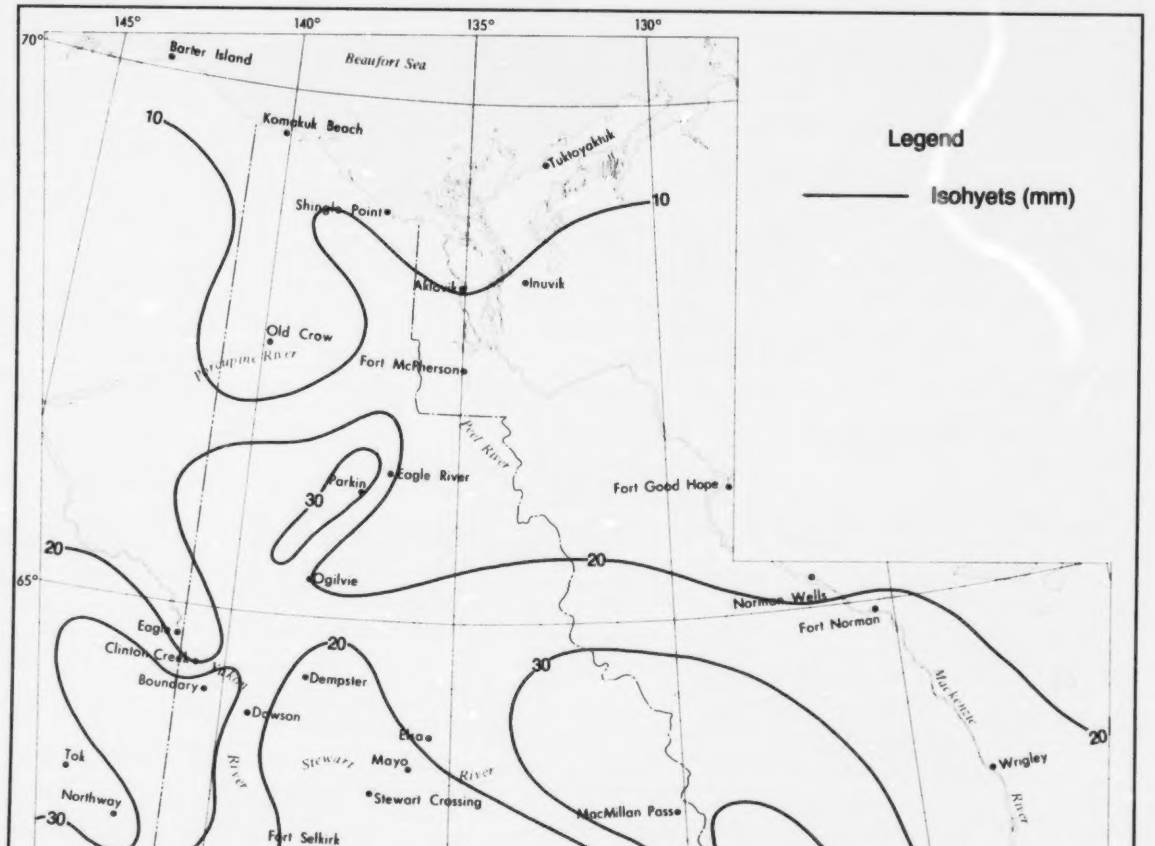

Legend
Isohyets (mm)
145°
140°
135°
130°
125°
70°
65°
60°
Beaufort Sea
PACIFIC OCEAN
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Yukon River
Dawson
Dempster
Elsa
Mayo
Stewart River
Stewart Crossing
Mackenzie River
Wrigley
Tok
Northway
MacMillan Pass
Fort Selkirk
Pelly River
Sheldon Lake
Beaver Creek
Snag
Anvil
Faro
Drury Creek
Carmacks
Ross River
South Nahanni River
Tungsten
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Whitehorse
Johnsons Crossing
Fort Liard
Yakutage
Teslin
Watson Lake
Swift River
Lower Post
Smith River
Carcross
Liard River
Mile 75
Atlin
Haines
Skagway
Cassiar
Muncho Lake
Summit
Taku River
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
Stikine River
Ware
Kinaskan Lake
Angoon
10
10
20
20
20
20
20
20
30
30
30
30
30
30
30
40
40
40
40
40
40
40
50
60
50
60
80
90
100
110
120
140
200
210
210
220
220
230
230

Figure 9.10 May mean total precipitation

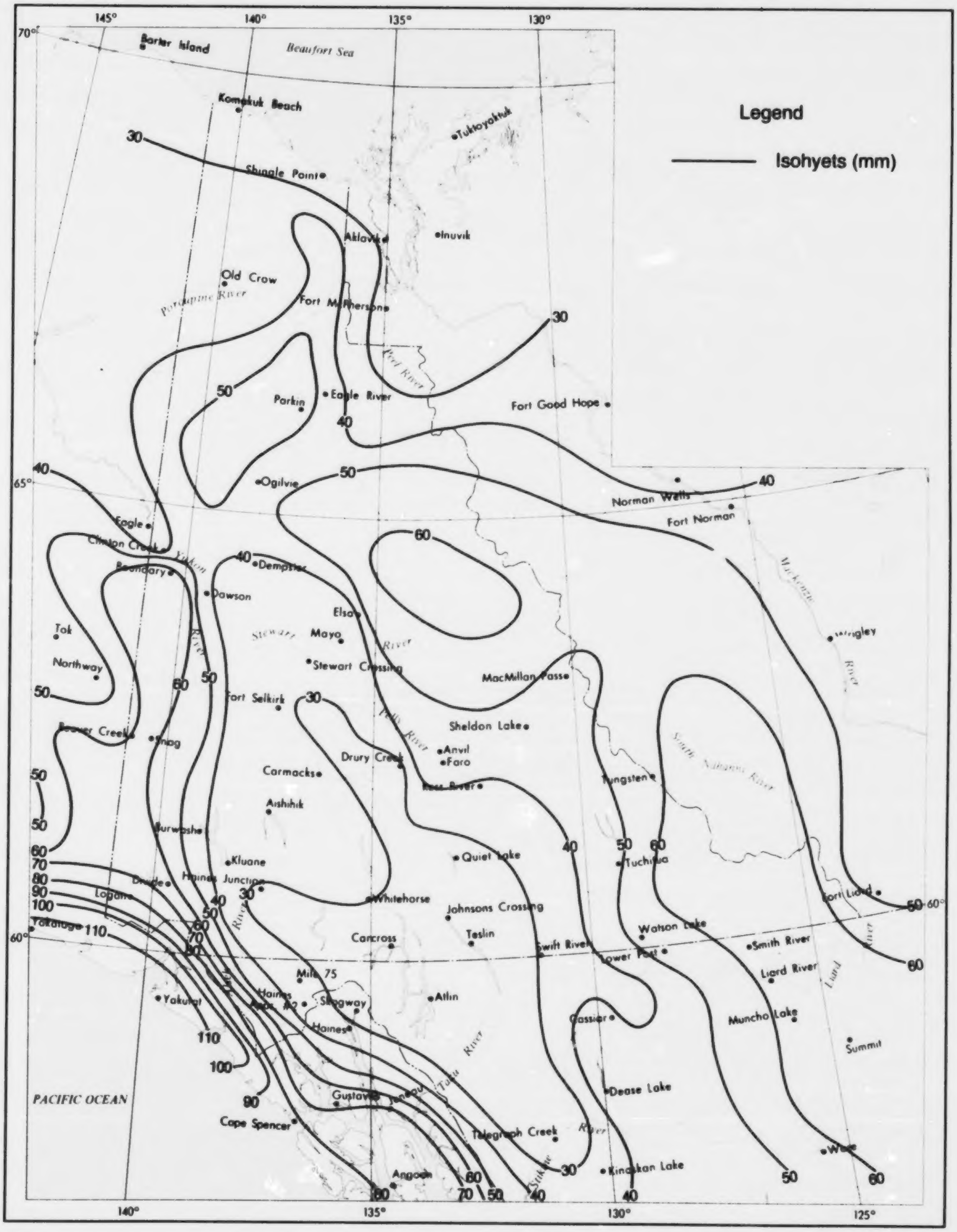

145°
140°
135°
130°
125°
70°
65°
60°
Legend
Isohyets (mm)
Beaufort Sea
PACIFIC OCEAN
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Yukon
Dempster
Dawson
Elsa
Mayo
Stewart River
Stewart Crossing
Mackenzie River
Wrigley
Tok
Northway
MacMillan Pass
Fort Selkirk
Sheldon Lake
Beaver Creek
Snag
Pelly River
Anvil
Faro
Drury Creek
Carmacks
Ross River
Tungsten
South Nahanni River
Aishihik
Burwash
Kluane
Quiet Lake
Tuchitua
Drury
Haines Junction
Logan
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Mile 75
Atlin
Haines Apt. #2
Skagway
Yakutat
Haines
Cassiar
Muncho Lake
Summit
Taku River
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
Stikine River
Ware
Kinaskan Lake
Angoon
30
40
50
60
70
80
90
100
110

Figure 9.11 June mean total precipitation

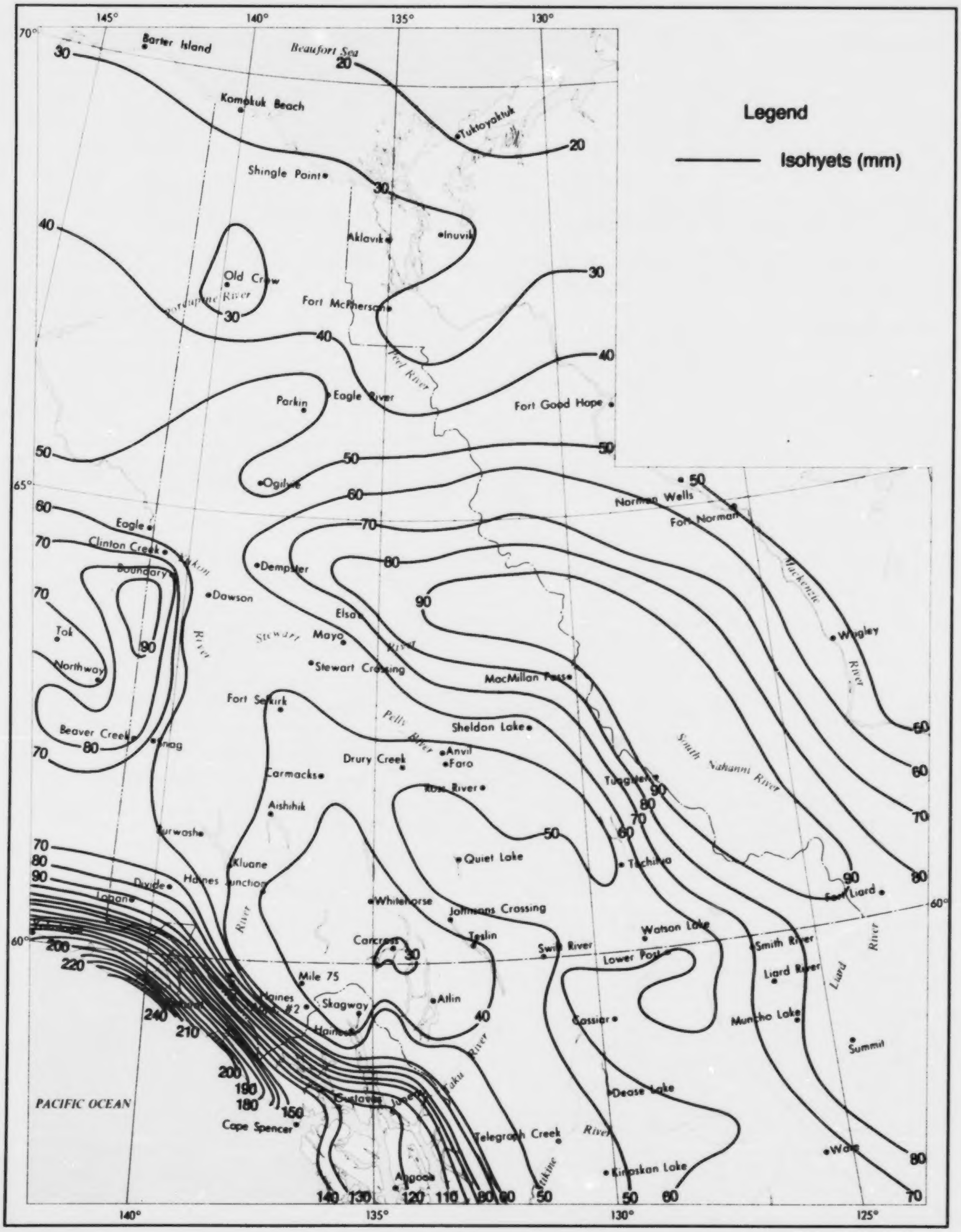

145°
140°
135°
130°
70°
65°
60°
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Yukon River
Dempster
Dawson
Elsa
Mayo
Stewart River
Stewart Crossing
Tok
Northway
Mackenzie River
Wrigley
MacMillan Pass
Fort Selkirk
Pelly River
Sheldon Lake
Beaver Creek
Snag
Drury Creek
Anvil
Faro
Carmacks
Ross River
Tungsten
South Nahanni River
Aishihik
Burwash
Quiet Lake
Tuchitua
Kluane
Haines Junction
Divide
Whitehorse
Fort Liard
Johnsons Crossing
Teslin
Watson Lake
Carcross
Swift River
Lower Post
Smith River
Liard River
Mile 75
Haines
Skagway
Atlin
Muncho Lake
Haines
Cassiar
Summit
Taku River
PACIFIC OCEAN
Dease Lake
Cape Spencer
Telegraph Creek
Stikine River
Ware
Angoon
Kinaskan Lake
Legend
Isohyets (mm)
20
30
40
50
60
70
80
90
110
120
130
140
150
180
190
200
210
220
240
125°

Figure 9.12 July mean total precipitation

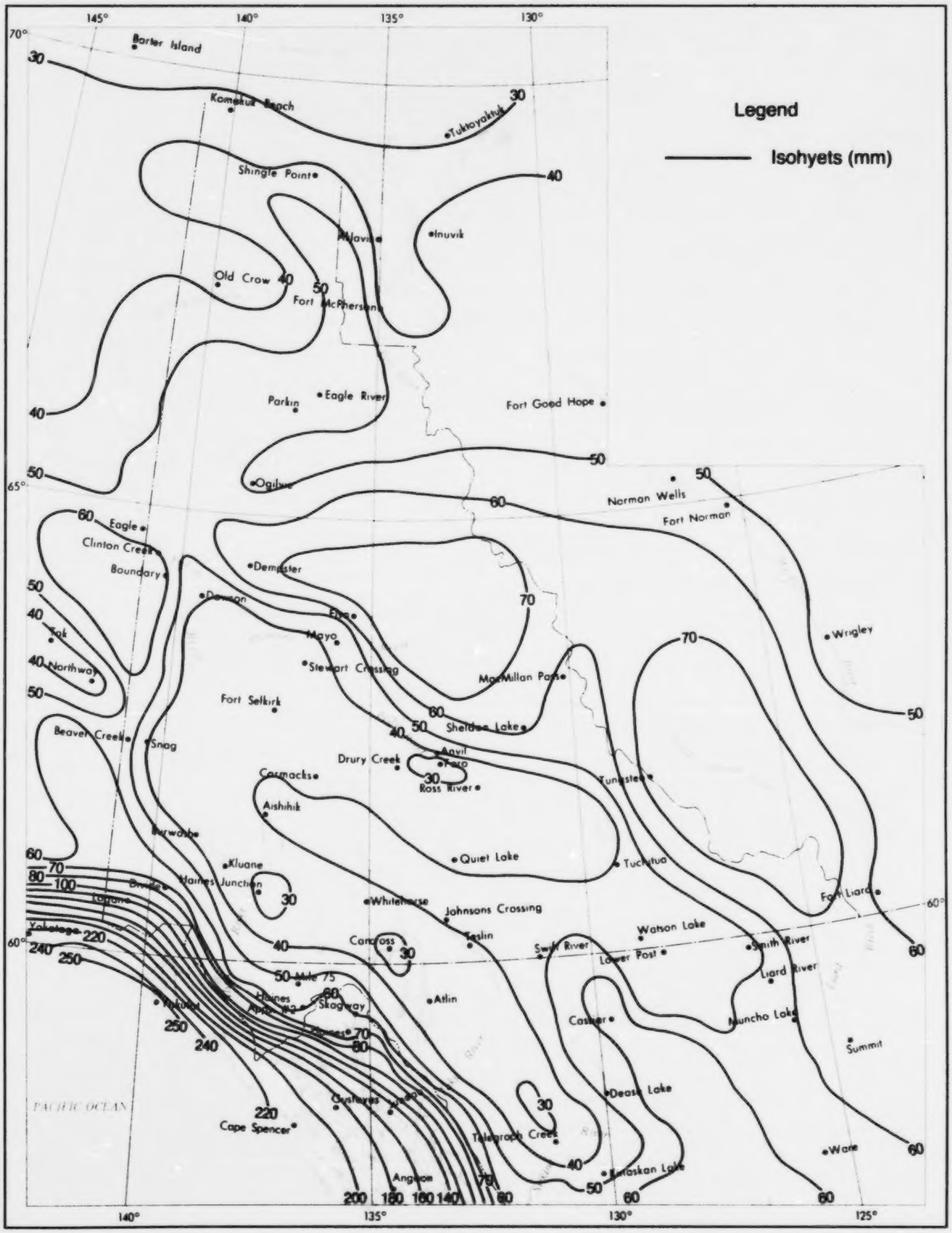

Legend
Isohyets (mm)
145°
140°
135°
130°
125°
70°
65°
60°
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Fort McPherson
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Stewart Crossing
MacMillan Pass
Wrigley
Tok
Northway
Fort Selkirk
Sheldon Lake
Beaver Creek
Snag
Drury Creek
Anvil
Faro
Ross River
Carmacks
Aishihik
Tungsten
Burwash
Kluane
Quiet Lake
Tuchitua
Haines Junction
Whitehorse
Johnsons Crossing
Fort Liard
Yakataga
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Yakutat
50 Mile
Haines
Skagway
Atlin
Cassiar
Muncho Lake
Summit
PACIFIC OCEAN
Dease Lake
Cape Spencer
Telegraph Creek
Ware
Kinaskan Lake
Angoon
30
40
50
60
70
80
100
140
160
180
200
220
240
250

Figure 9.13 August mean total precipitation

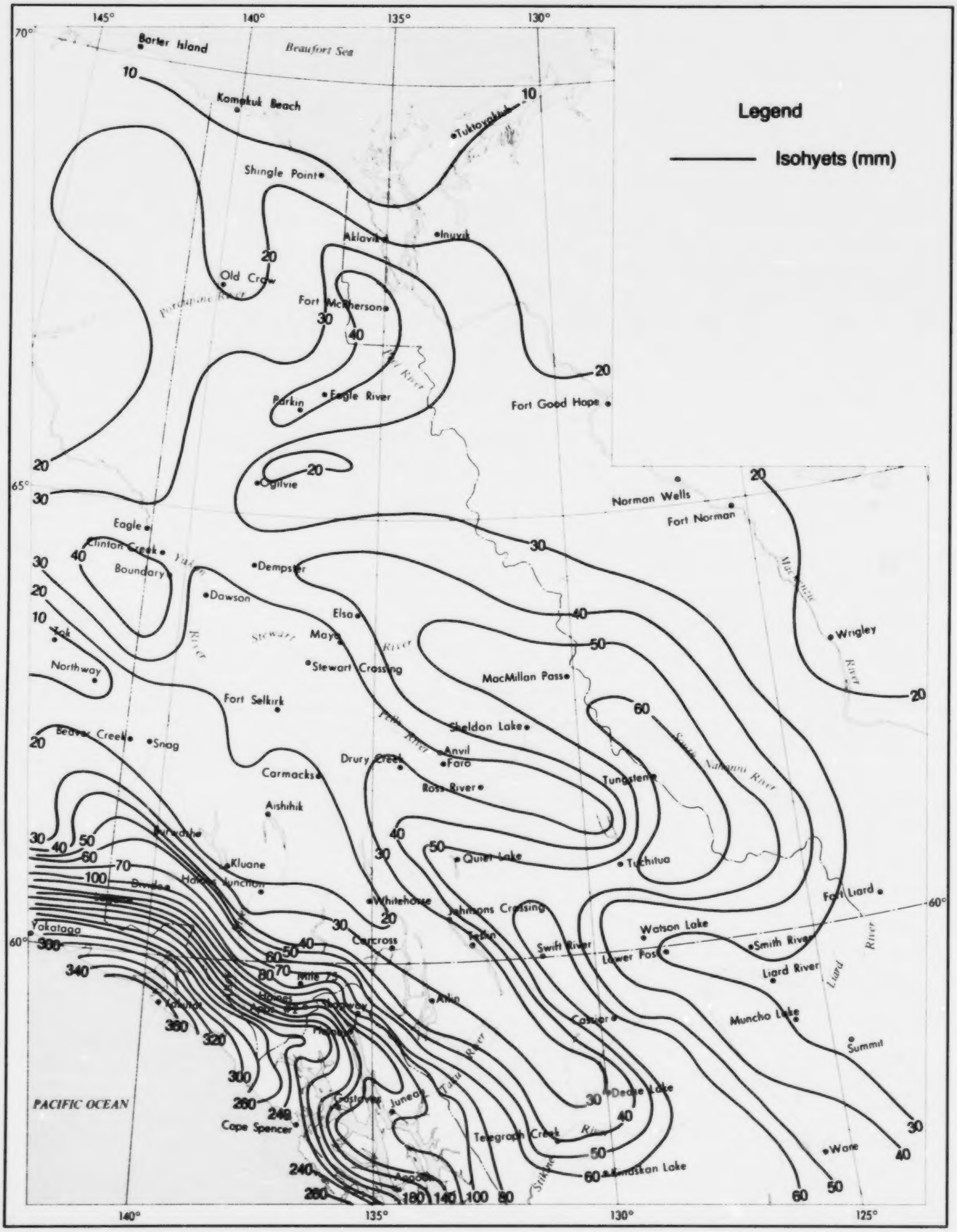

145°
140°
135°
130°
70°
Barter Island
Beaufort Sea
10
Komakuk Beach
Tuktoyaktuk
10
Legend
Isohyets (mm)
Shingle Point
Aklavik
Inuvik
20
Old Crow
Porcupine River
Fort McPherson
30
40
Peel River
20
Fort Good Hope
Parkin
Eagle River
20
20
Ogilvie
65°
30
Norman Wells
Fort Norman
20
Eagle
Clinton Creek
40
Yukon
Boundary
30
Dempster
30
20
Dawson
40
Elsa
10
Tok
Stewart River
Mayo
50
Wrigley
Mackenzie River
Northway
Stewart Crossing
MacMillan Pass
Fort Selkirk
60
20
Sheldon Lake
Beaver Creek
Snag
Pelly River
South Nahanni River
20
Anvil
Drury Creek
Faro
Carmacks
Tungsten
Ross River
Aishihik
Burwash
30
40
50
60
40
50
70
Kluane
30
Quiet Lake
Tuchitua
100
Divide
Haines Junction
Whitehorse
Johnsons Crossing
Fort Liard
60°
Yakataga
30
20
60°
380
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
50
40
60
Liard River
340
80
70
Mile 75
Liard
Haines
Atlin
Yakutat
Skagway
Muncho Lake
360
Cassiar
320
Taku River
Summit
300
PACIFIC OCEAN
Gustavus
Juneau
30
Dease Lake
260
240
40
Cape Spencer
Telegraph Creek
30
50
Ware
40
240
Angoon
60
Kinaskan Lake
Stikine
60
50
280
180
140
100
80
140°
135°
130°
125°

Figure 9.14 September mean total precipitation

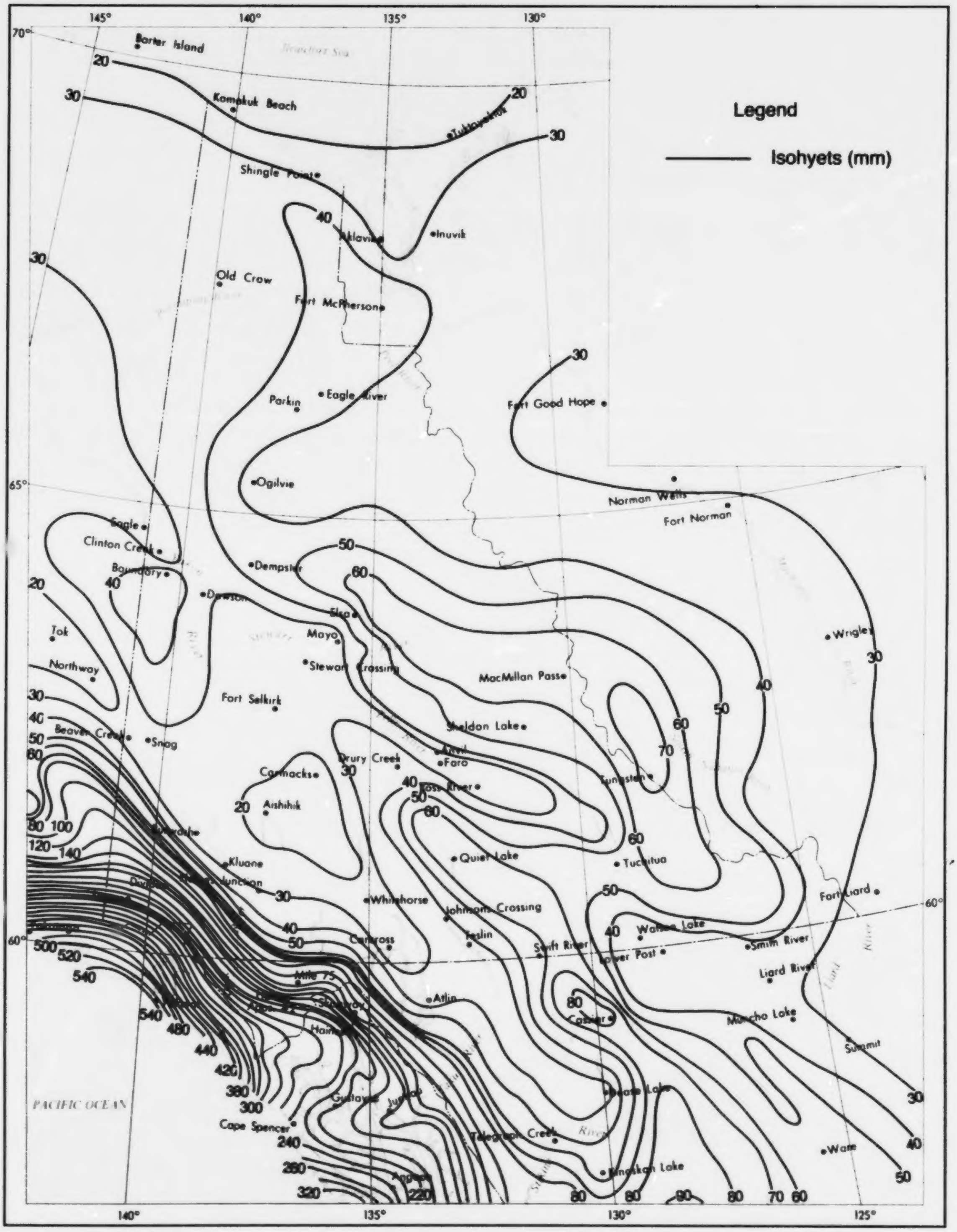

Legend
Isohyets (mm)
145°
140°
135°
130°
125°
70°
65°
60°
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Fort McPherson
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Tok
Northway
Stewart Crossing
MacMillan Pass
Wrigley
Fort Selkirk
Beaver Creek
Snag
Sheldon Lake
Drury Creek
Anvil
Faro
Carmacks
Ross River
Tungsten
Aishihik
Burwash
Kluane
Haines Junction
Quiet Lake
Tuchitua
Whitehorse
Johnsons Crossing
Fort Liard
Watson Lake
Carcross
Teslin
Swift River
Lower Post
Smith River
Liard River
Mile 75
Atlin
Skagway
Haines
Cassiar
Muncho Lake
Summit
Dease Lake
Gustavus
Juneau
Cape Spencer
Telegraph Creek
Dease Lake
Iskut River
Ware
Angoon
PACIFIC OCEAN
20
30
40
50
60
70
80
90
100
120
140
220
240
260
300
320
380
420
440
480
500
520
540

Figure 9.15 October mean total precipitation

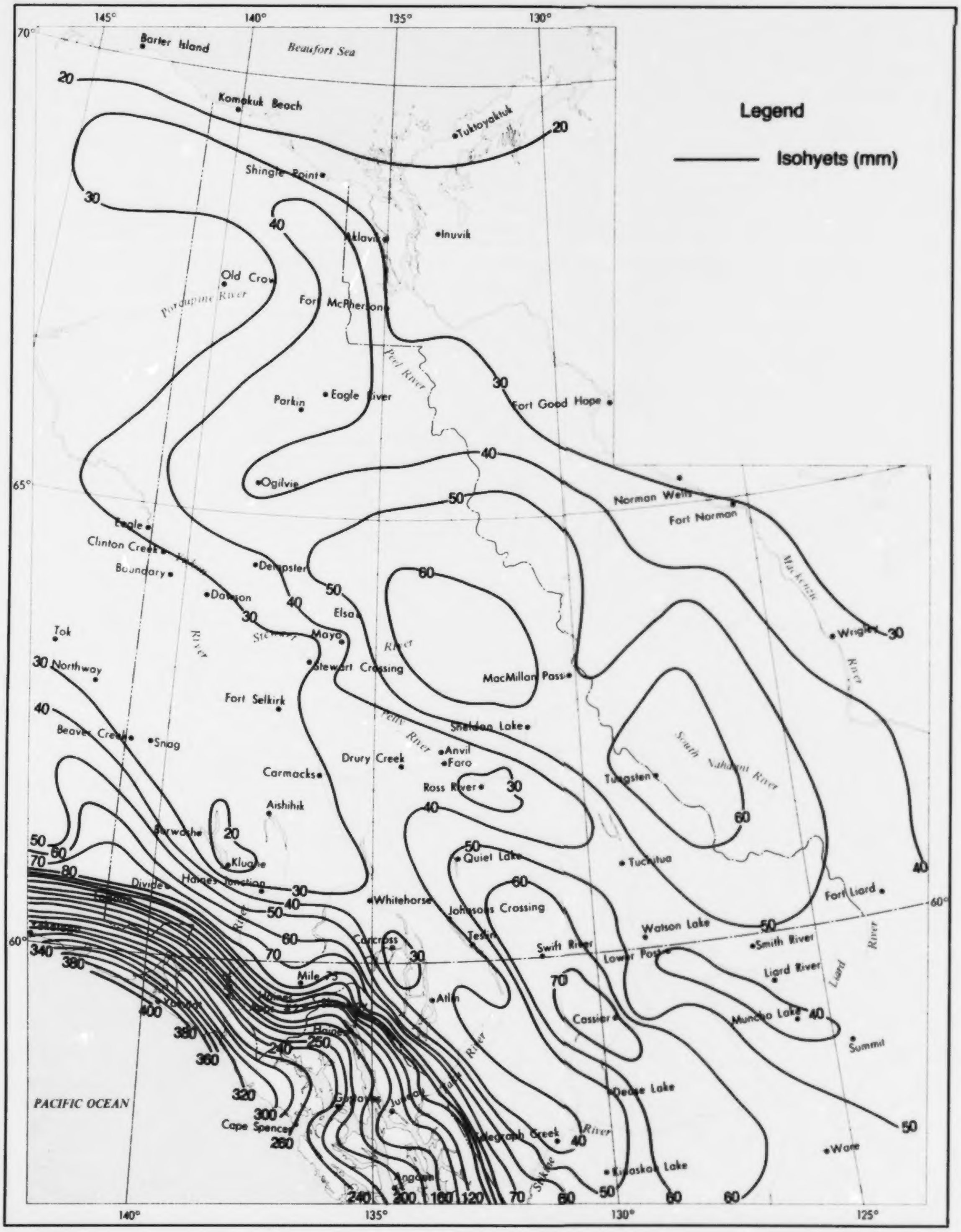

Legend
Isohyets (mm)
145°
140°
135°
130°
125°
70°
65°
60°
Barter Island
Beaufort Sea
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Porcupine River
Fort McPherson
Peel River
Fort Good Hope
Parkin
Eagle River
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Stewart
River
Stewart Crossing
Tok
Northway
Fort Selkirk
Mackenzie
River
Wrigley
MacMillan Pass
Sheldon Lake
Pelly River
Beaver Creek
Snag
Drury Creek
Anvil
Faro
Carmacks
Ross River
Aishihik
Tungsten
South Nahanni River
Burwash
Kluane
Quiet Lake
Tuchitua
Divide
Haines Junction
Whitehorse
Johnsons Crossing
Fort Liard
Watson Lake
Smith River
Carcross
Teslin
Swift River
Lower Post
Liard River
Liard
River
Mile 75
Atlin
Haines
Cassiar
Muncho Lake
Summit
Yakutat
PACIFIC OCEAN
Gustavus
Juneau
Taku
River
Dease Lake
Cape Spencer
Telegraph Creek
River
Stikine
Kinaskan Lake
Ware
Angoon
20
30
40
50
60
70
80
120
160
200
240
250
260
300
320
340
360
380
400

Figure 9.16 November mean total precipitation

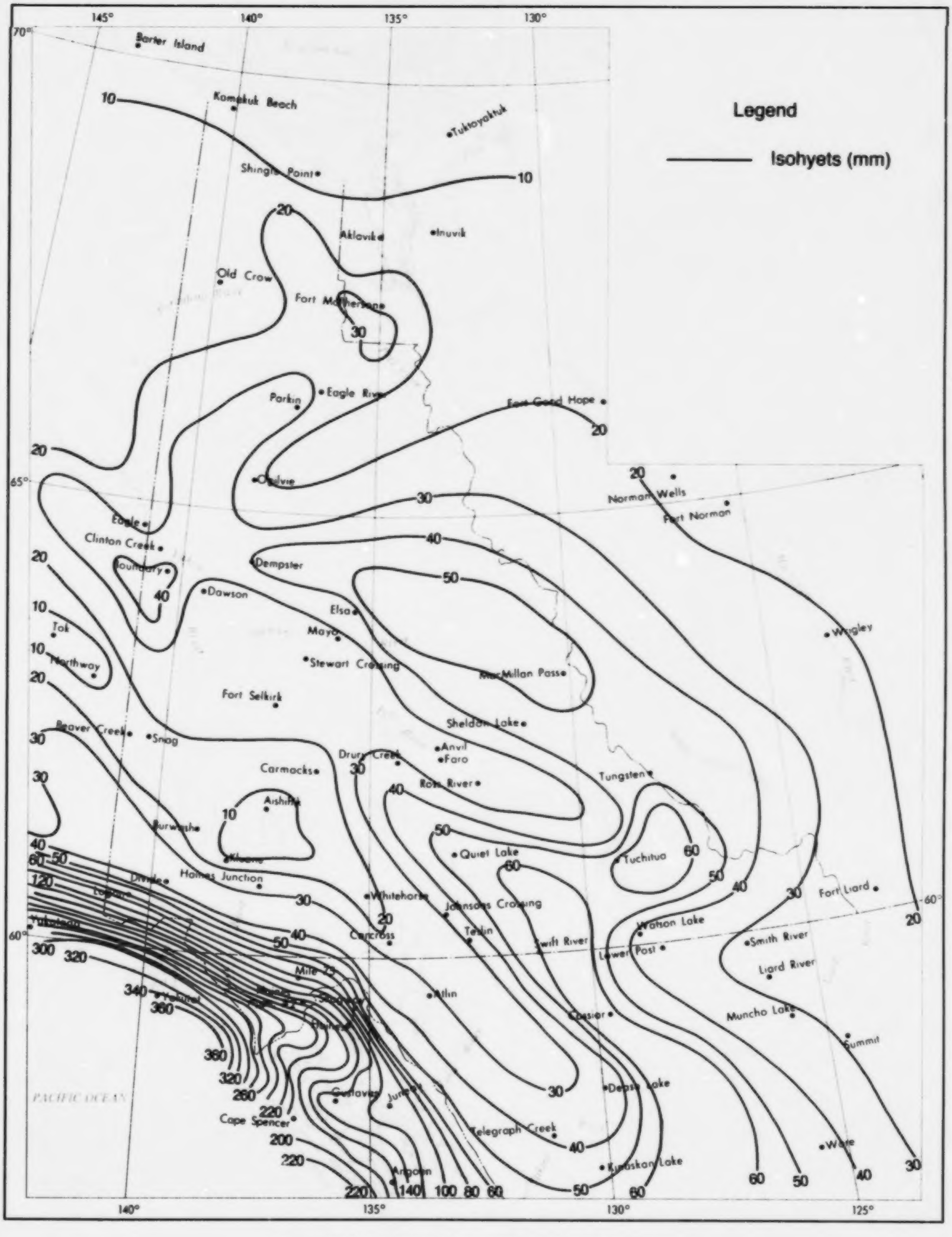

Legend
Isohyets (mm)
145°
140°
135°
130°
125°
70°
65°
60°
Barter Island
Komakuk Beach
Tuktoyaktuk
Shingle Point
Aklavik
Inuvik
Old Crow
Fort McPherson
Parkin
Eagle River
Fort Good Hope
Ogilvie
Norman Wells
Fort Norman
Eagle
Clinton Creek
Boundary
Dempster
Dawson
Elsa
Mayo
Tok
Northway
Stewart Crossing
MacMillan Pass
Wrigley
Fort Selkirk
Sheldon Lake
Beaver Creek
Snag
Drury Creek
Anvil
Faro
Carmacks
Ross River
Tungsten
Aishihik
Burwash
Quiet Lake
Tuchitua
Kluane
Haines Junction
Whitehorse
Johnsons Crossing
Fort Liard
Yakutat
Carcross
Teslin
Swift River
Watson Lake
Lower Post
Smith River
Liard River
Mile 75
Skagway
Atlin
Cassiar
Muncho Lake
Summit
Gustavus
Juneau
Dease Lake
Cape Spencer
Telegraph Creek
Ware
Kinaskan Lake
Argoon
PACIFIC OCEAN
10
20
30
40
50
60
80
100
120
140
200
220
260
300
320
340
360

Figure 9.17 December mean total precipitation

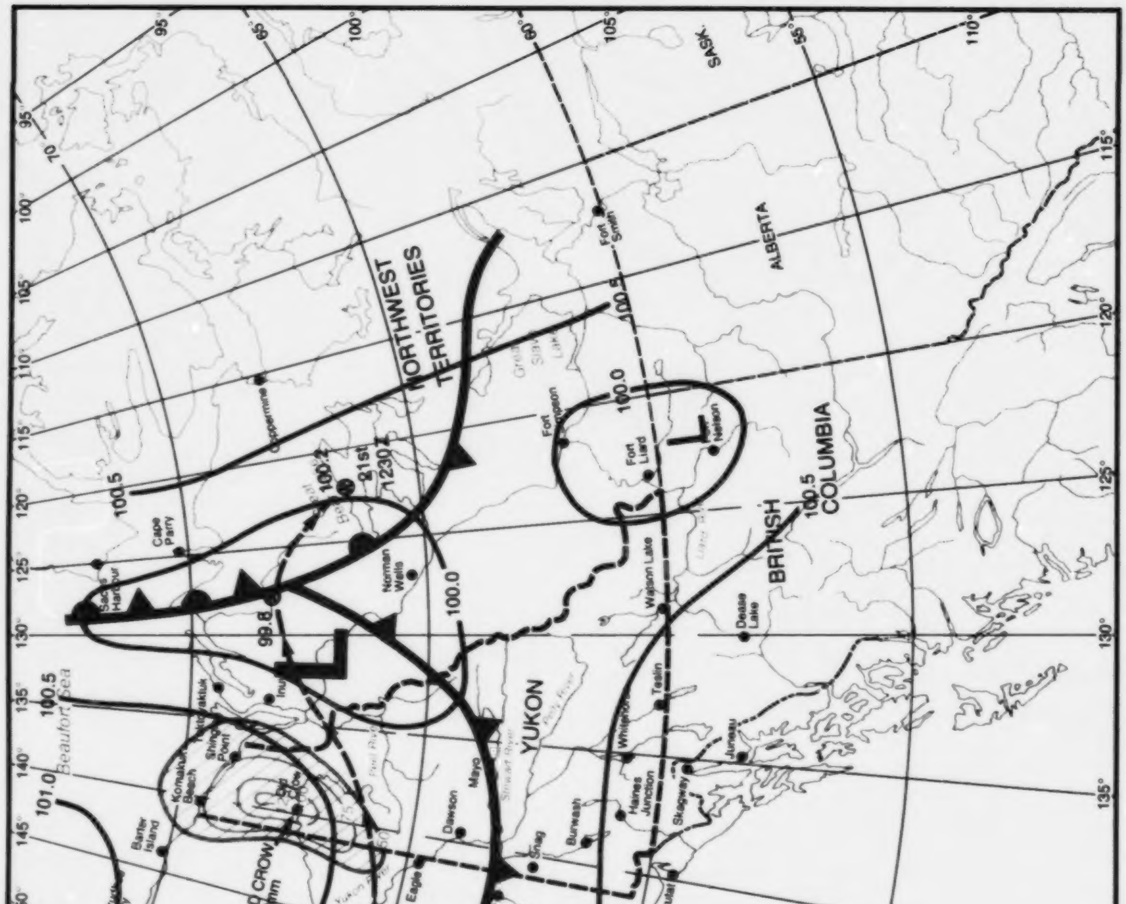

NORTHWEST TERRITORIES
YUKON
ALASKA
BRITISH COLUMBIA
ALBERTA
SASK.
Beaufort Sea
Chukchi Sea
Bering Strait
Bering Sea
Gulf of Alaska
OLD CROW 122mm
19th 1230Z
21st 1230Z
99.8
100.0
100.2
100.5
101.0
Sachs Harbour
Cape Parry
Coppermine
Norman Wells
Fort Simpson
Fort Liard
Fort Nelson
Fort Smith
Watson Lake
Dease Lake
Teslin
Whitehorse
Haines Junction
Burwash
Snag
Skagway
Juneau
Yakutat
Dawson
Mayo
Eagle
Inuvik
Shingle Point
Komakuk Beach
Barter Island
Fort Yukon
Anchorage
Valdez
McGrath
Kotzebue
Nome
Bethel
Legend
IsoPascals (kPa)
Low Centre History
Area Enclosed by 5cm Isohyet (Total Storm)
Isohyet (mm)

Figure 9.18 Total storm rainfall in a July cyclone over northern Yukon

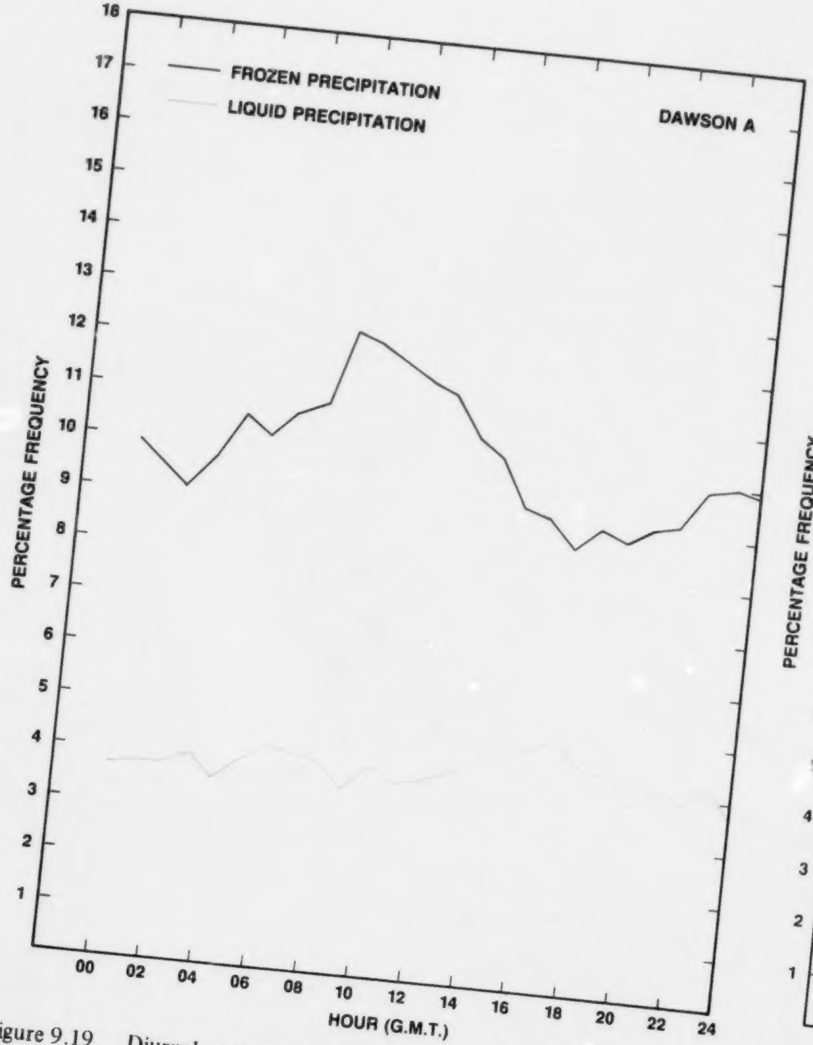


Figure 9.19 Diurnal percentage frequency of occurrence of liquid and frozen precipitation for Dawson A

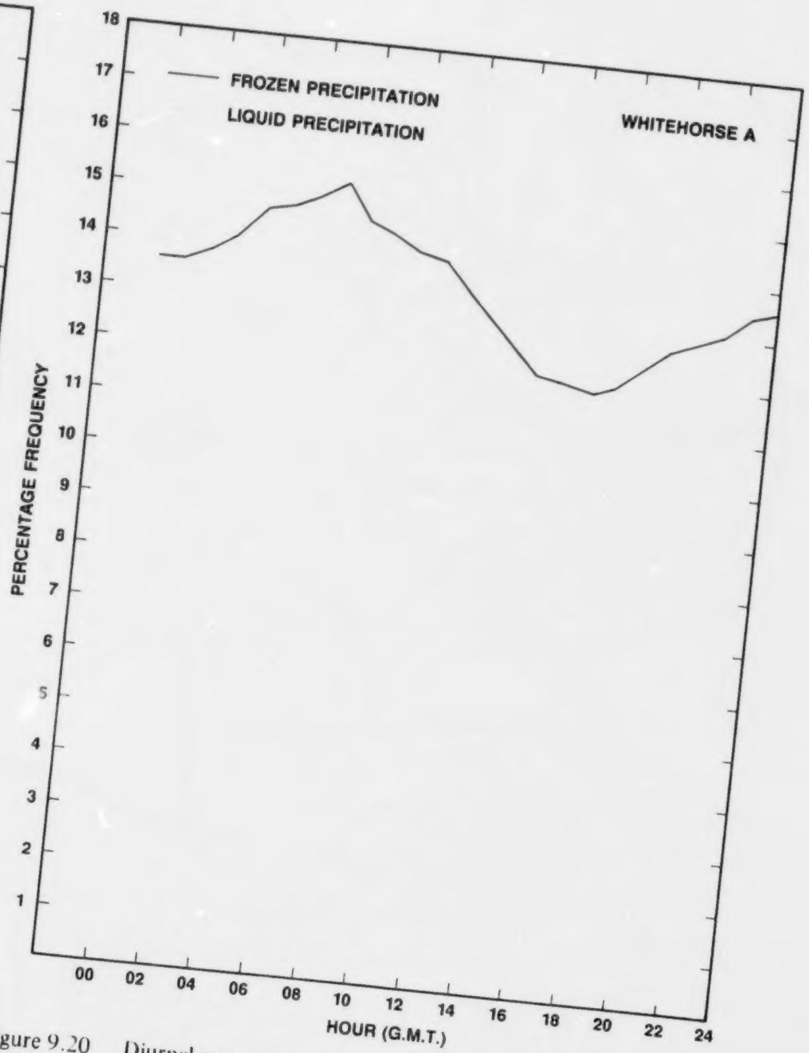


Figure 9.20 Diurnal percentage frequency of occurrence of liquid and frozen precipitation for Whitehorse A

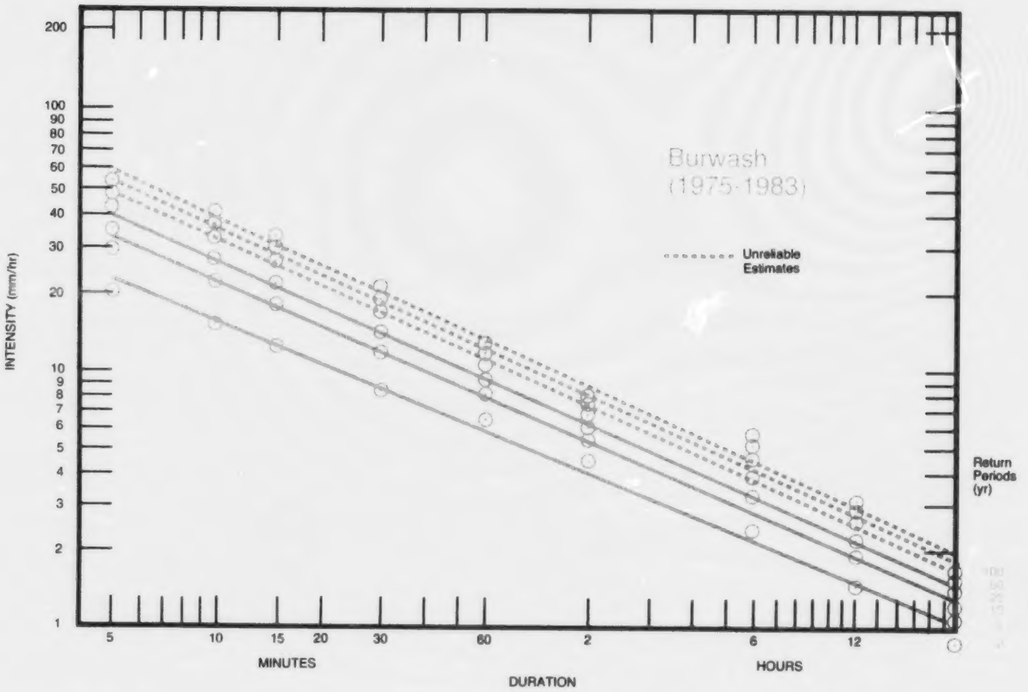


Figure 9.21 Short-duration rainfall intensity-duration frequency for various return periods

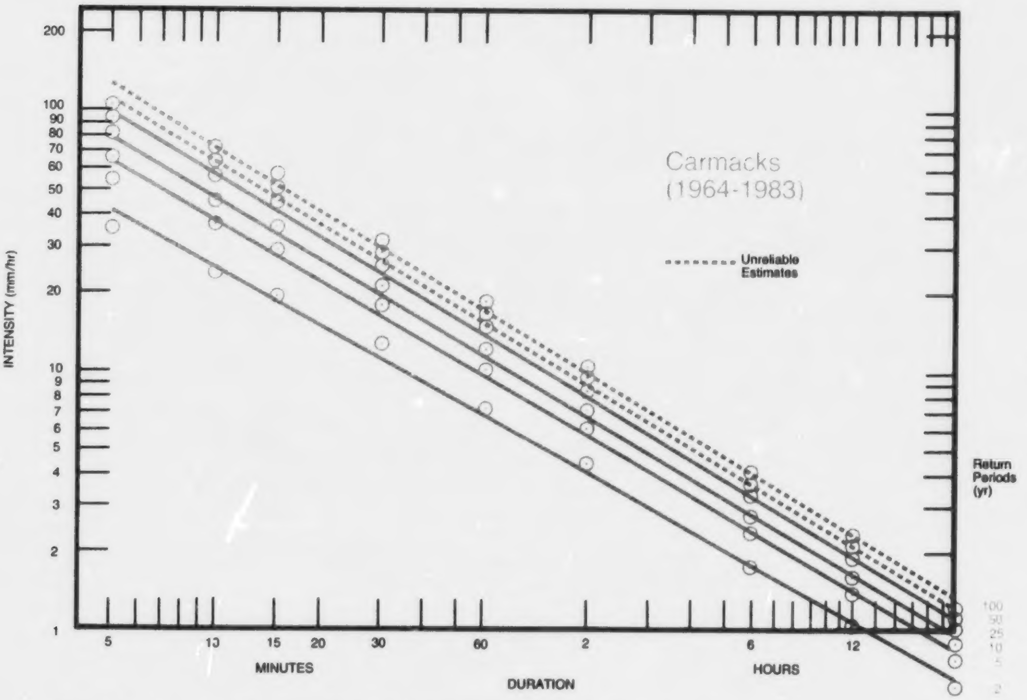


Figure 9.22 Short-duration rainfall intensity-duration frequency for various return periods

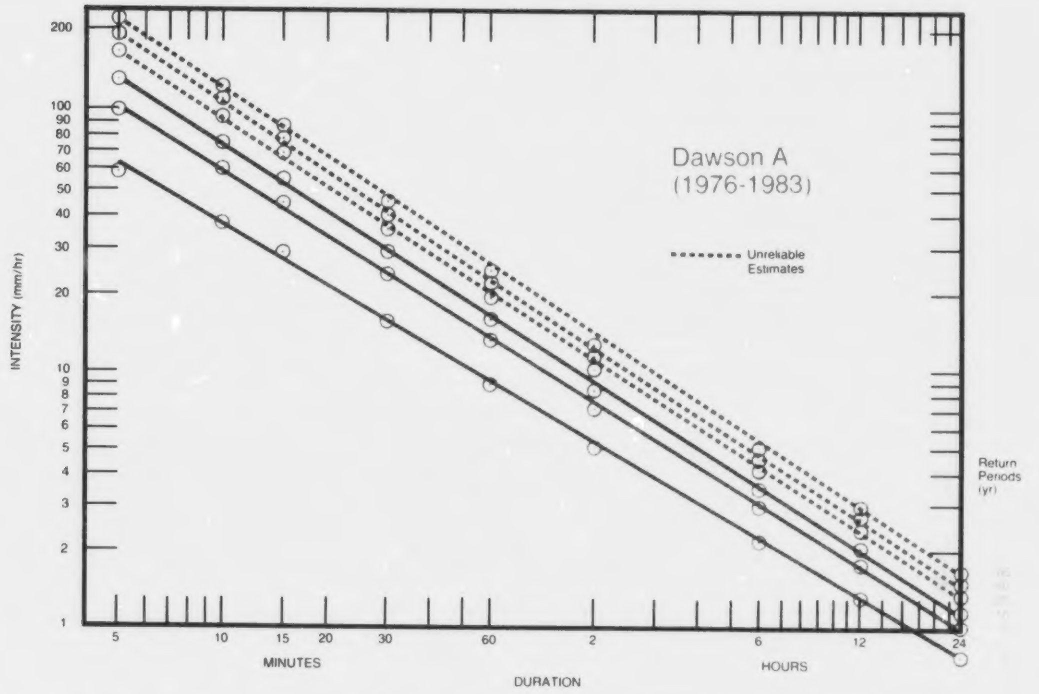


Figure 9.23 Short-duration rainfall intensity-duration frequency for various return periods

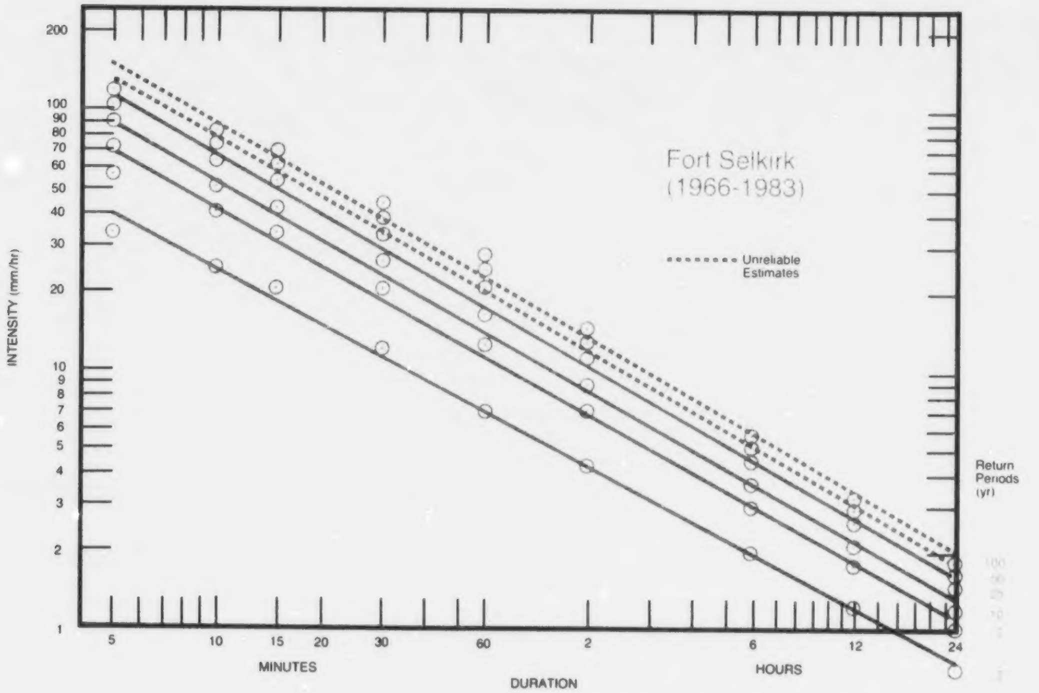


Figure 9.24 Short-duration rainfall intensity-duration frequency for various return periods

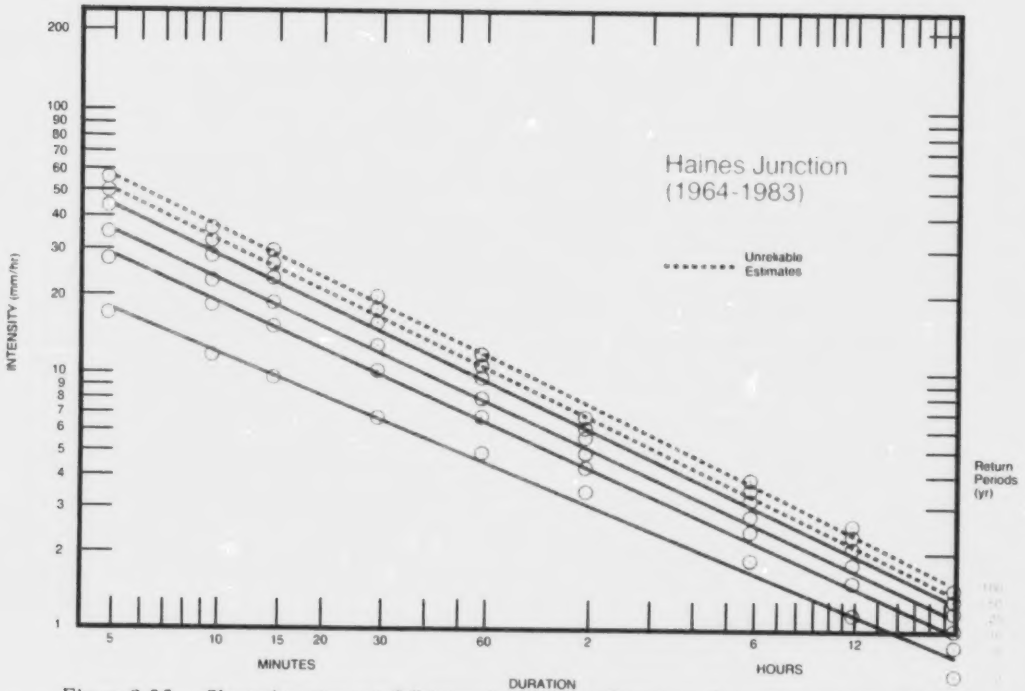


Figure 9.25 Short-duration rainfall intensity-duration frequency for various return periods

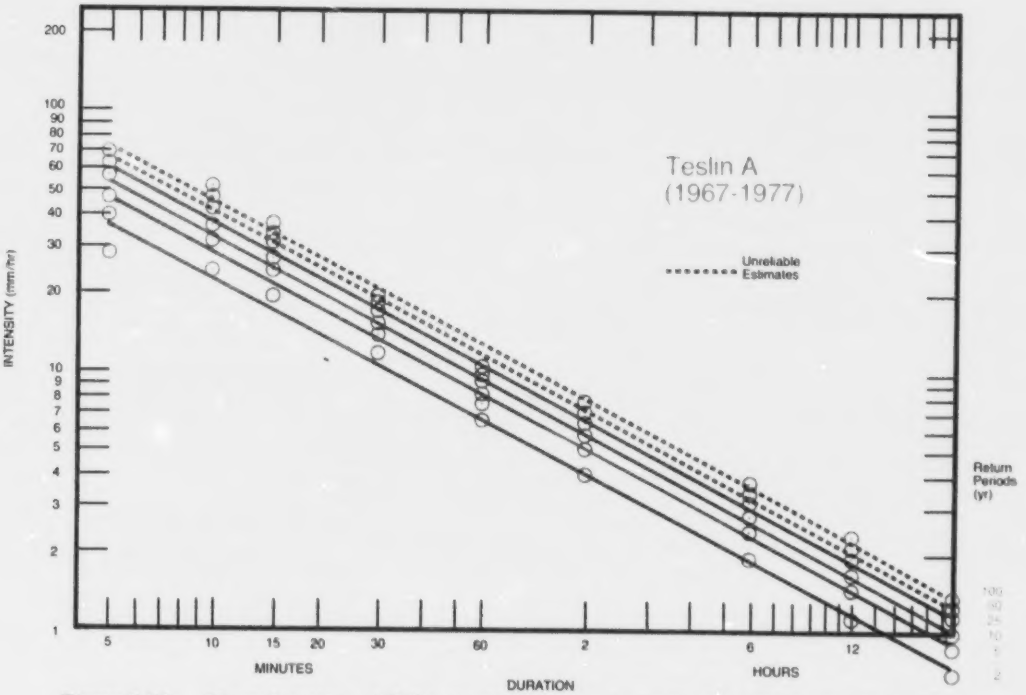


Figure 9.26 Short-duration rainfall intensity-duration frequency for various return periods

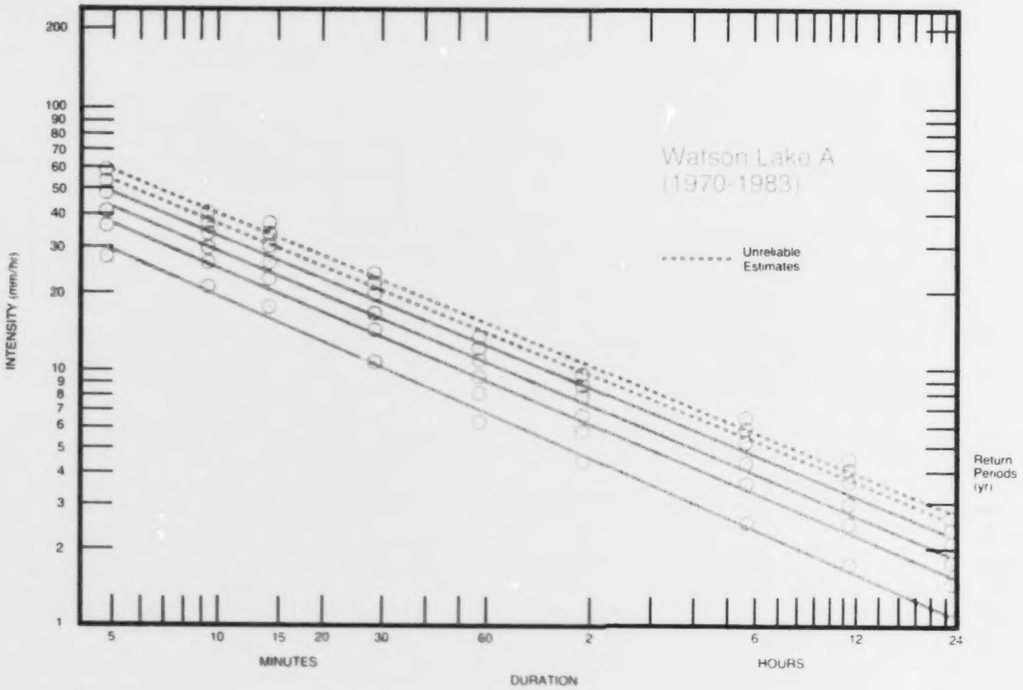


Figure 9.27 Short-duration rainfall intensity-duration frequency for various return periods

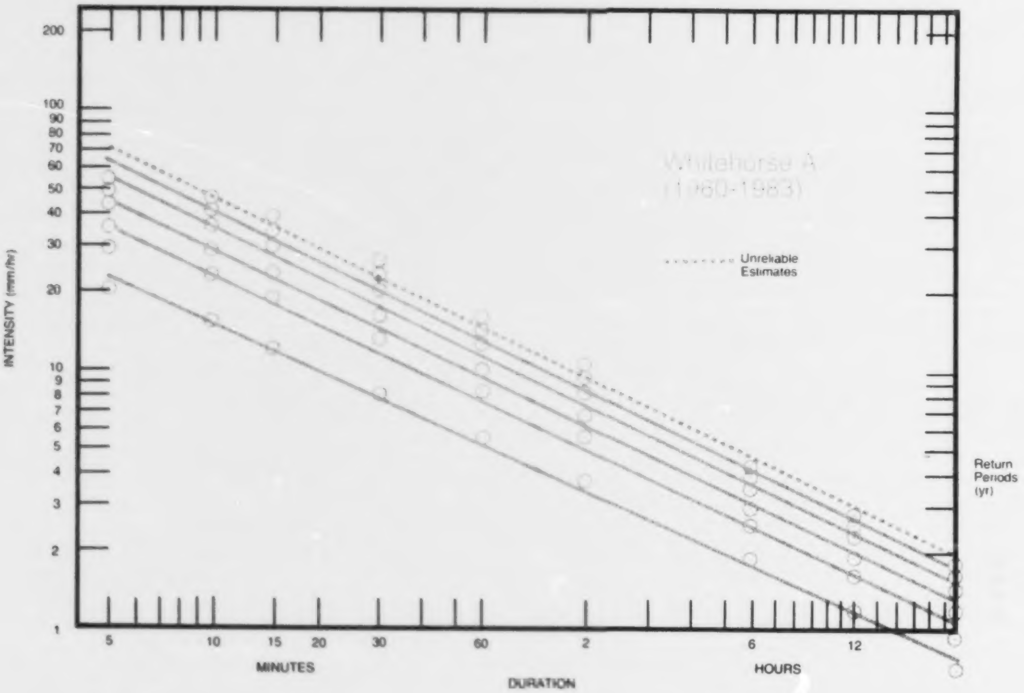


Figure 9.28 Short-duration rainfall intensity-duration frequency for various return periods

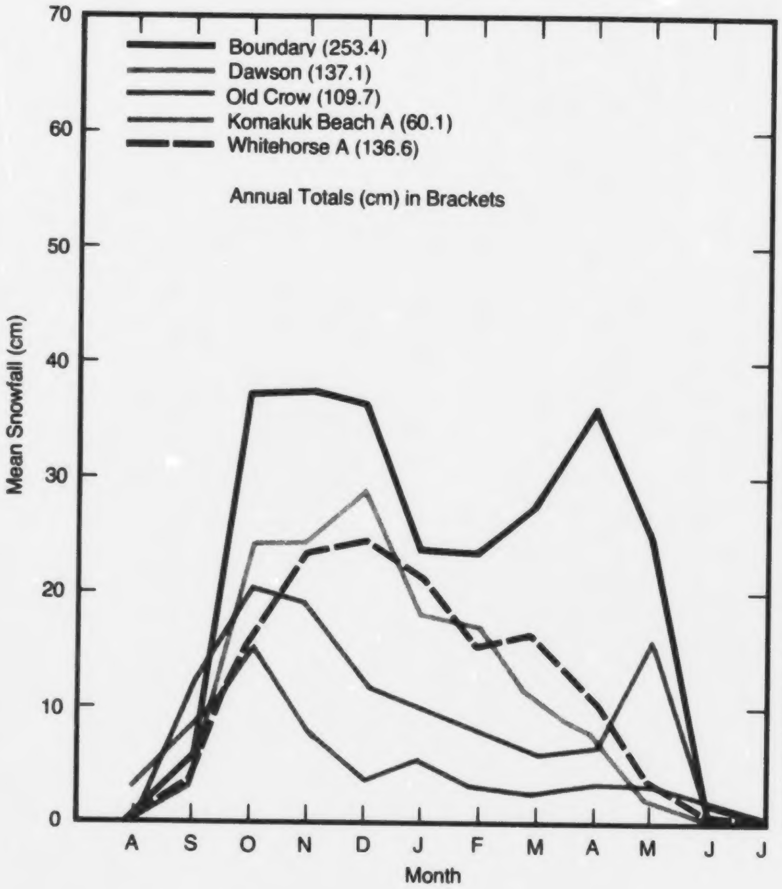


Figure 9.29 Mean total snowfall by month for selected stations

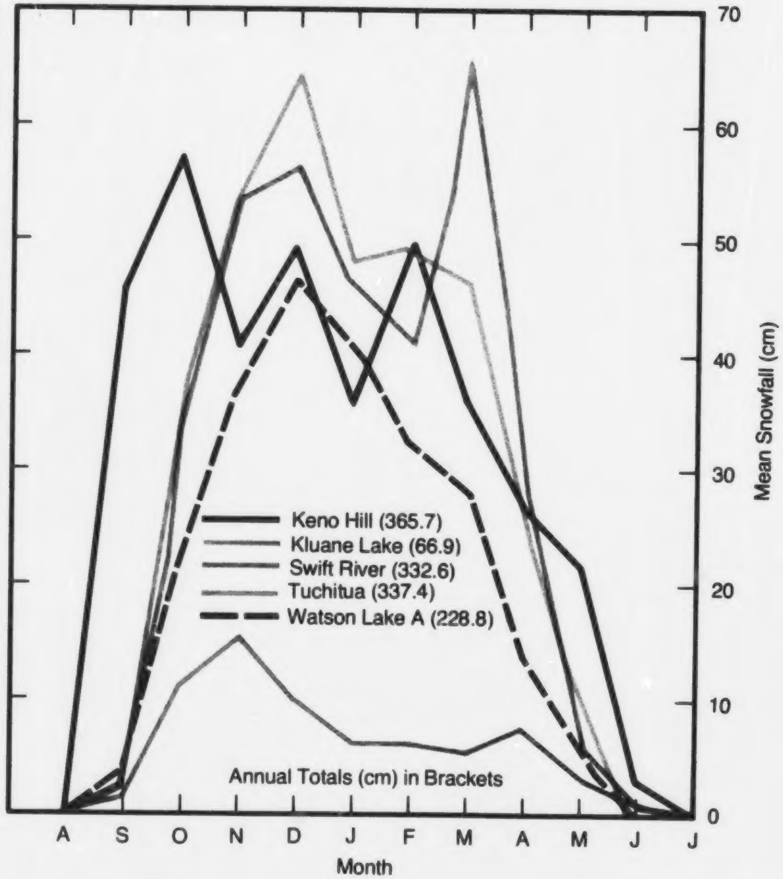


Figure 9.30 Mean total snowfall by month for selected stations

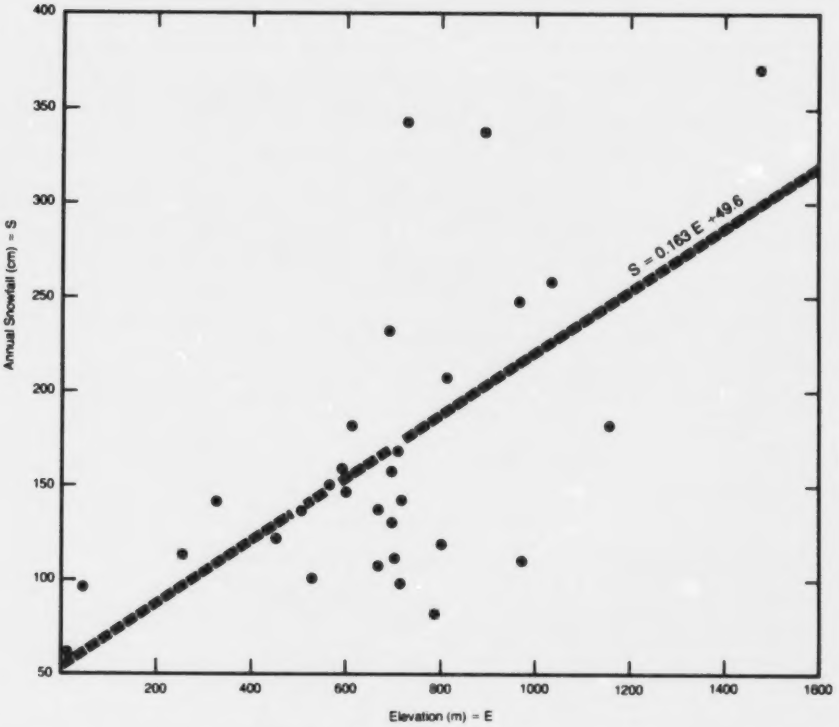


Figure 9.31 Mean annual snowfall variation with elevation for 30 stations in Yukon

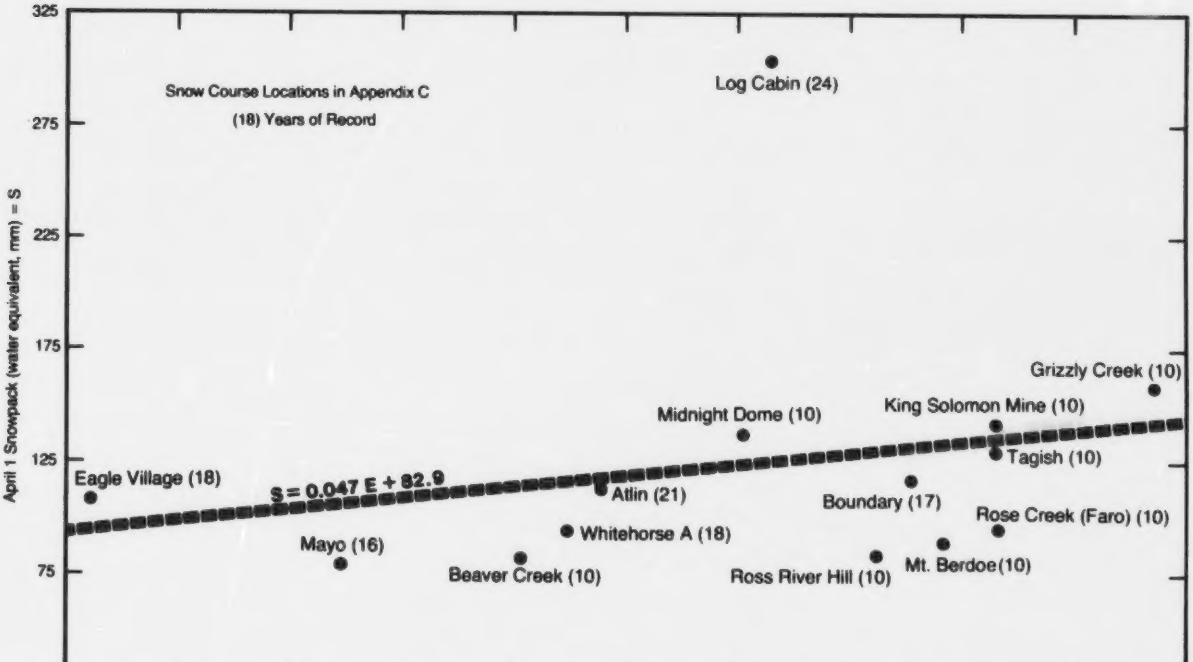


Figure 9.32 Average April 1 snowpack (water equivalent) variation with elevation in the Yukon River basin

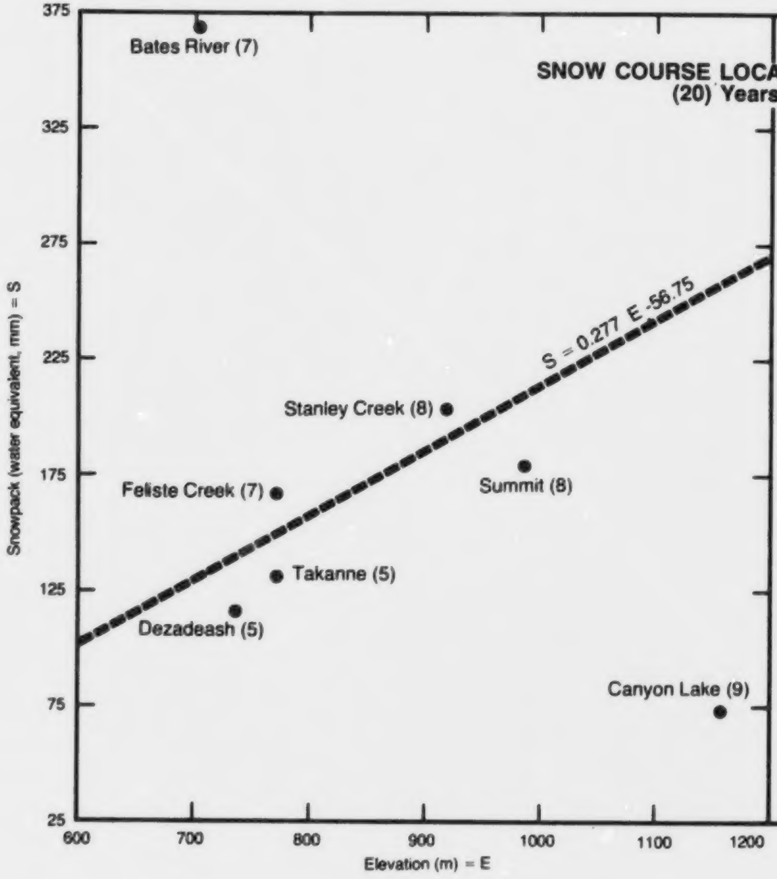


Figure 9.33 Average April 1 snowpack (water equivalent) variation with elevation in the Alsek River basin

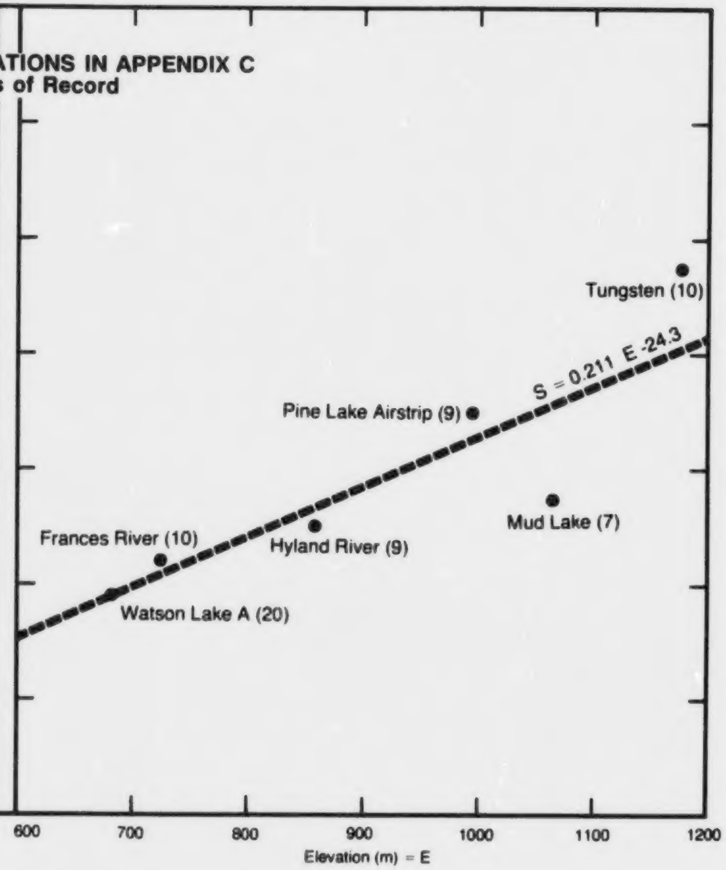


Figure 9.34 Average April 1 snowpack (water equivalent) variation with elevation in the Liard River basin

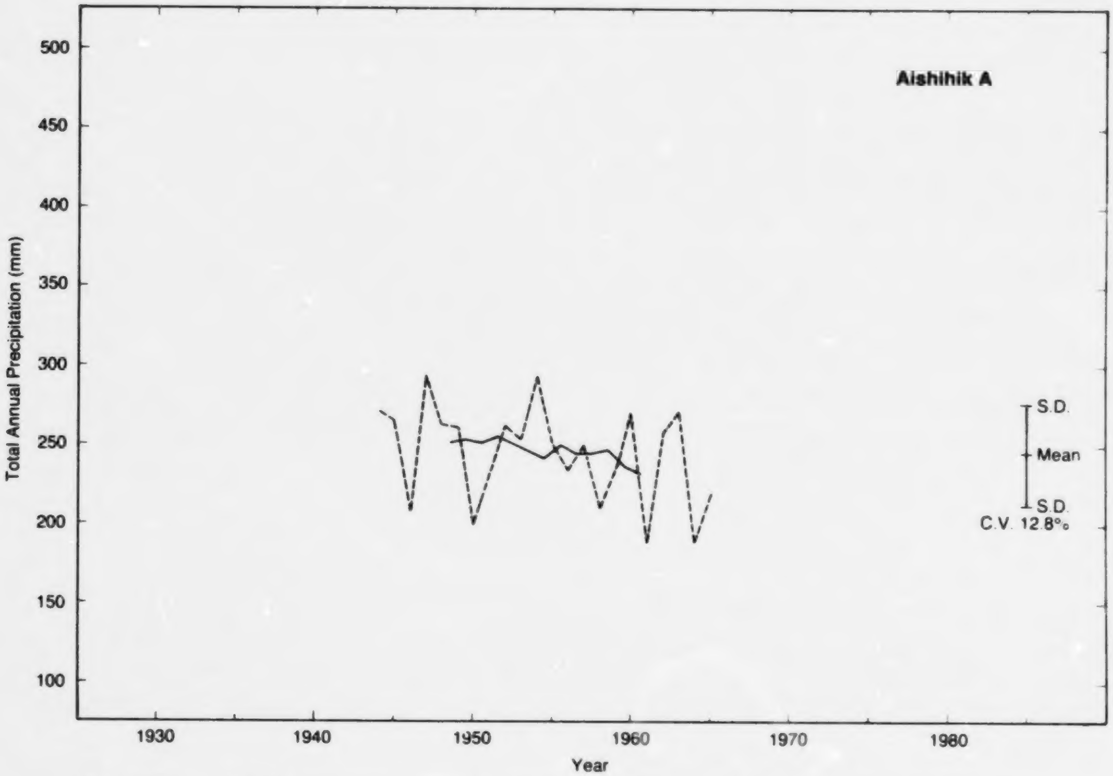


Figure 9.35 Aishihik year-to-year total annual precipitation variation and ten-year running means

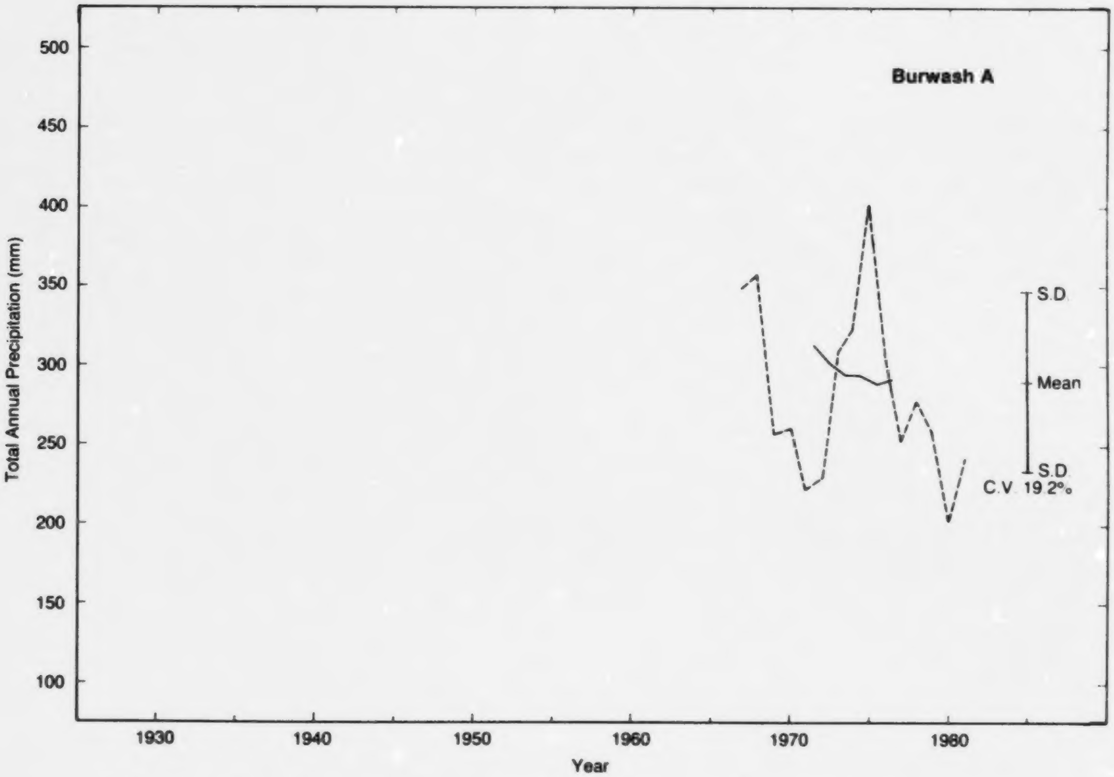


Figure 9.36 Burwash A year-to-year total annual precipitation variation and ten-year running means

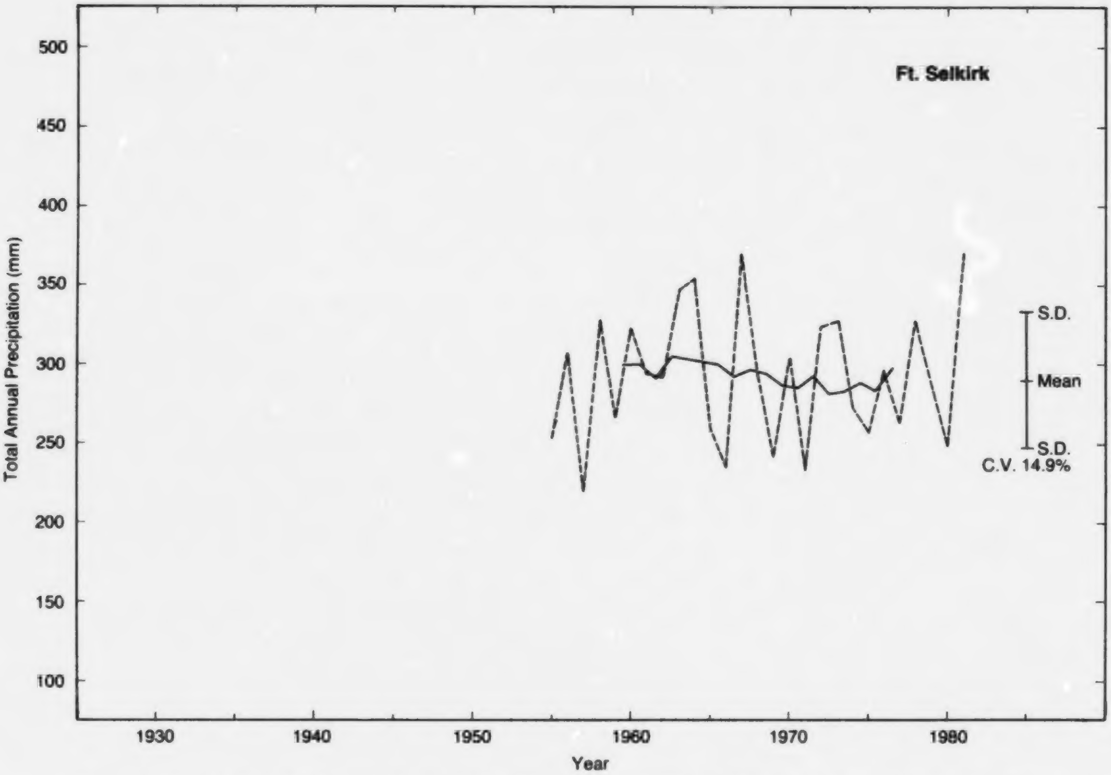


Figure 9.37 Fort Selkirk year-to-year total annual precipitation variation and ten-year running means

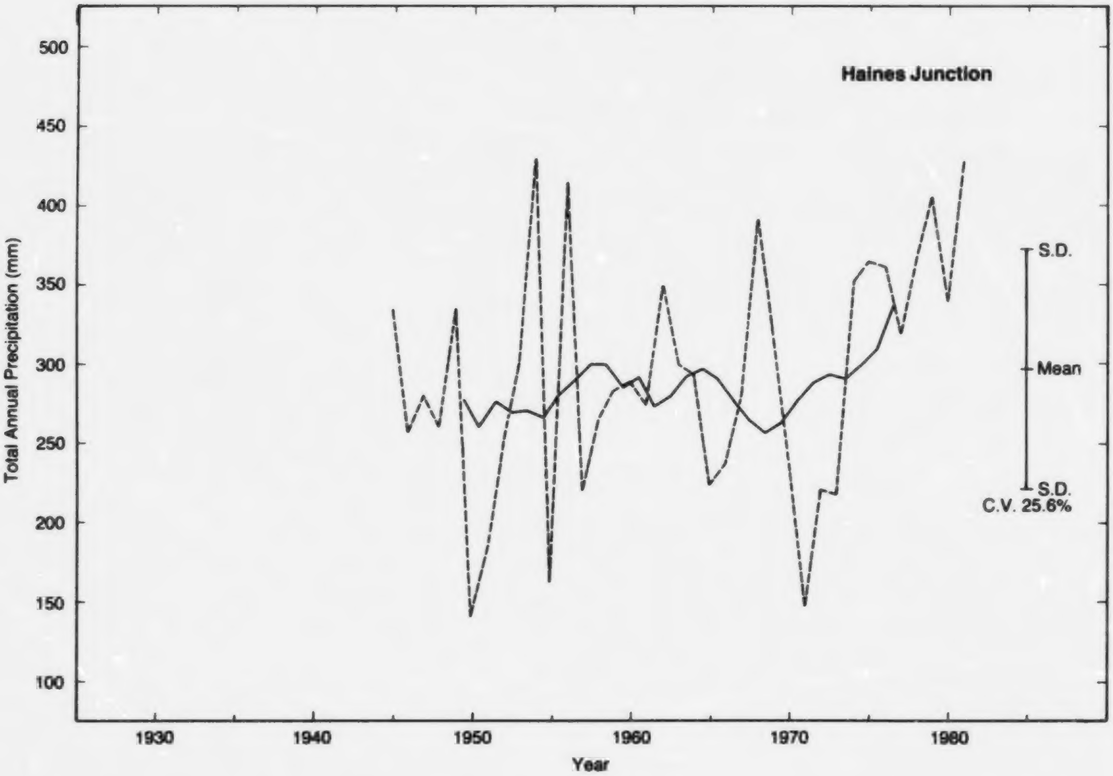


Figure 9.38 Haines Junction year-to-year total annual precipitation variation and ten-year running means

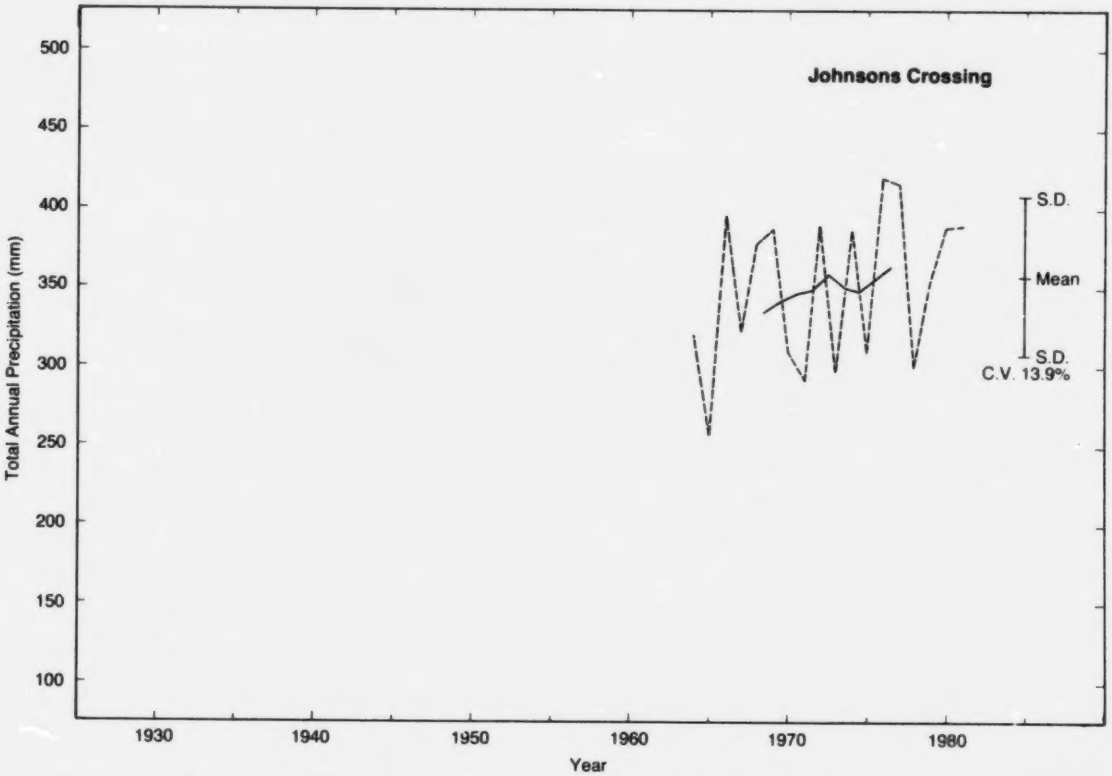


Figure 9.39 Johnson's Crossing year-to-year total annual precipitation variation and ten-year running means

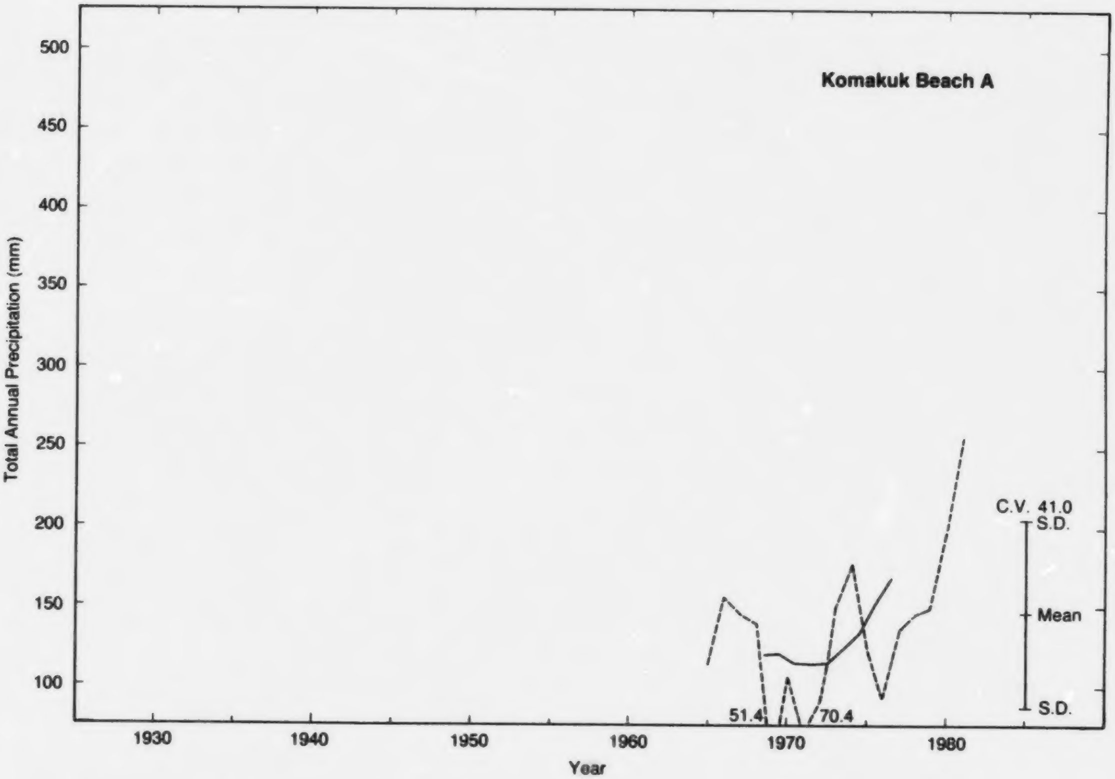


Figure 9.40 Komakuk Beach A year-to-year total annual precipitation variation and ten-year running means

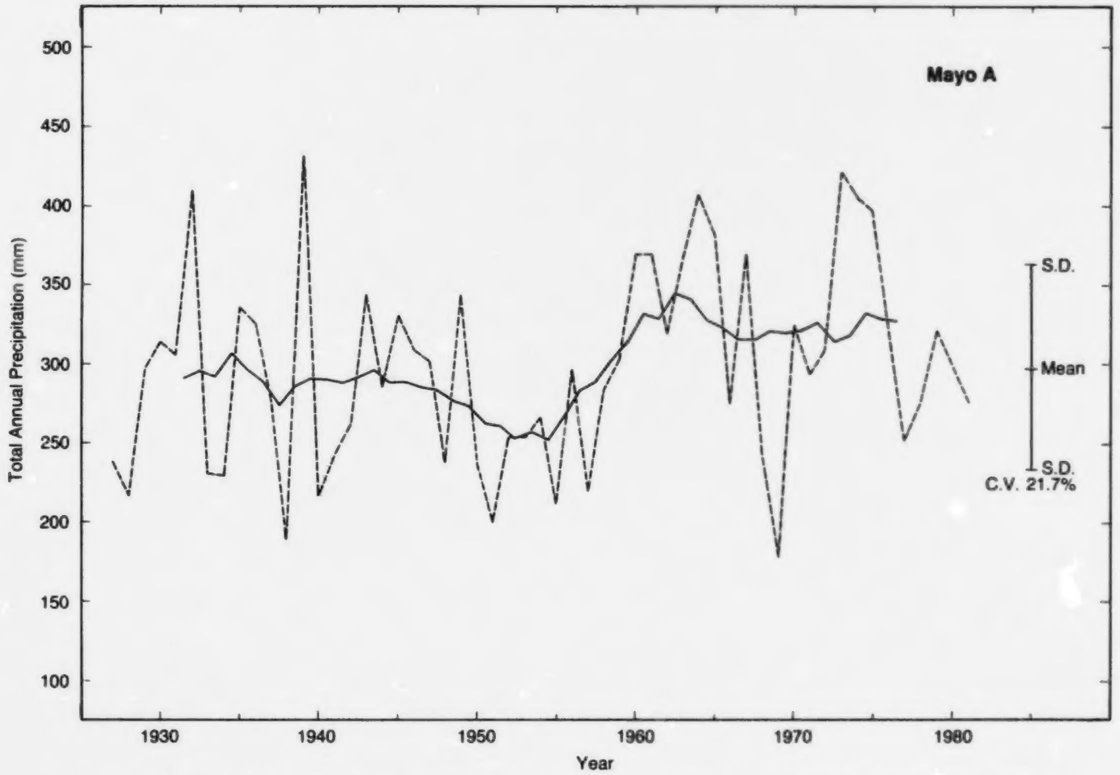


Figure 9.41 Mayo A year-to-year total annual precipitation variation and ten-year running means

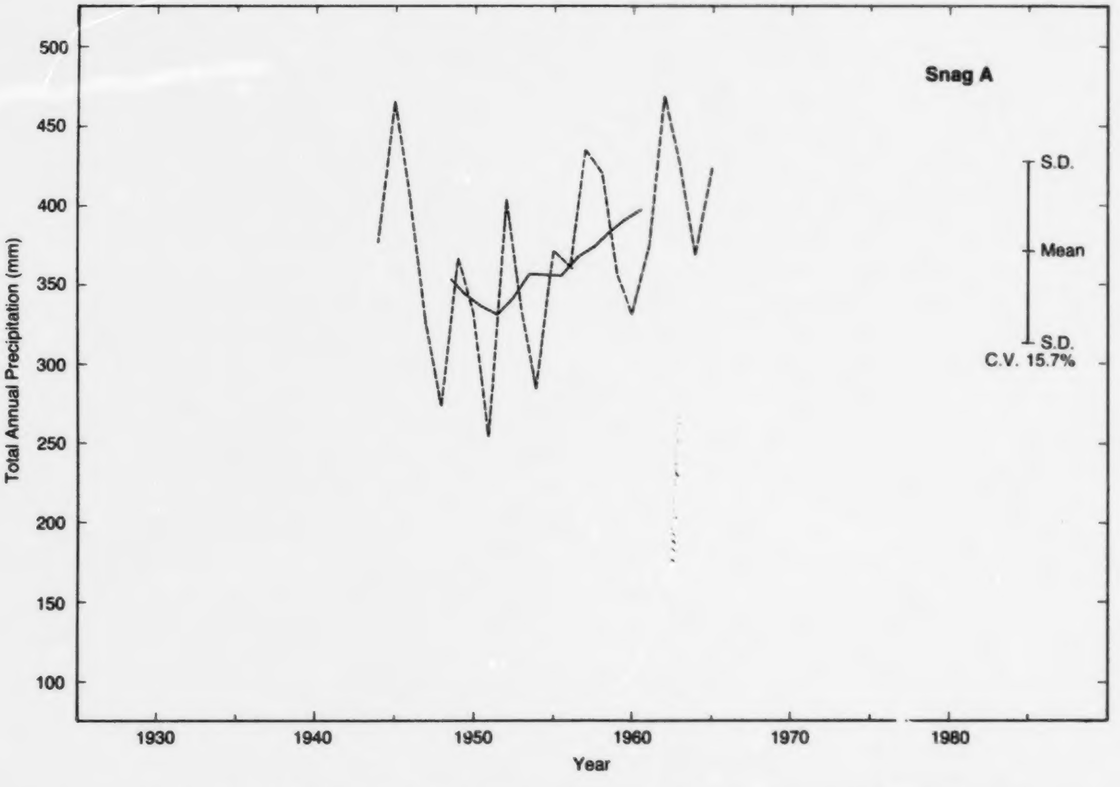


Figure 9.42 Snag A year-to-year total annual precipitation variation and ten-year running means

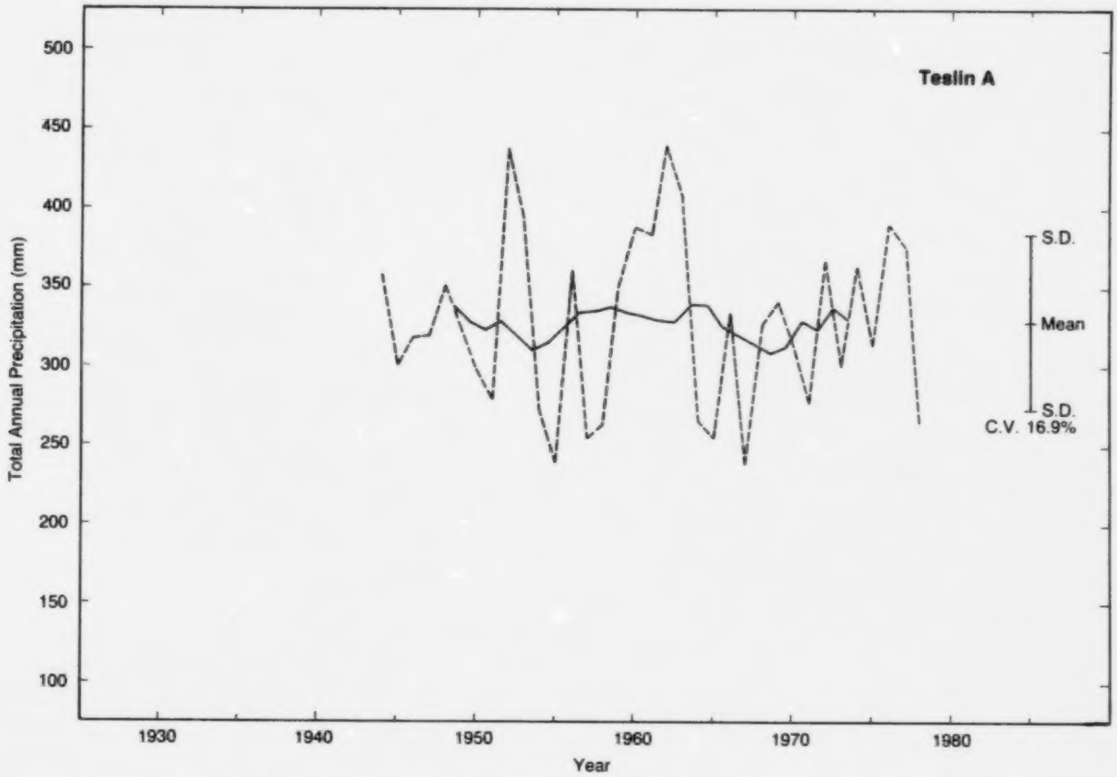


Figure 9.43 Teslin A year-to-year total annual precipitation variation and ten-year running means

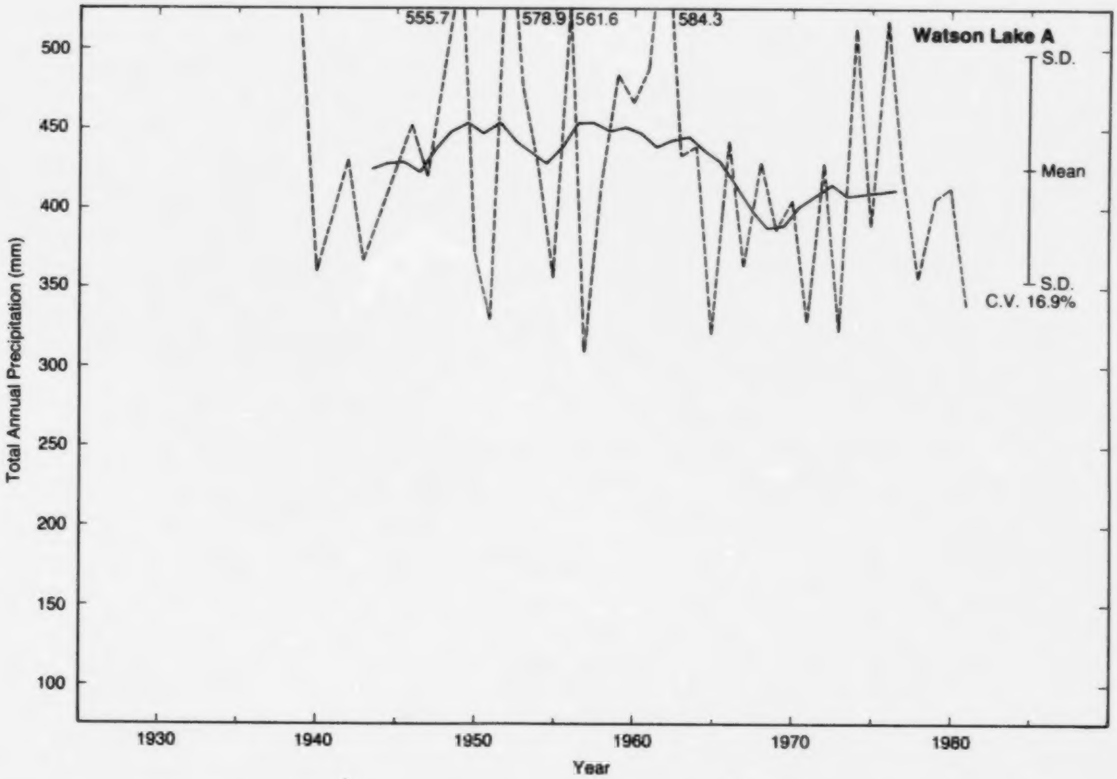


Figure 9.44 Watson Lake A year-to-year annual precipitation variation and ten-year running means

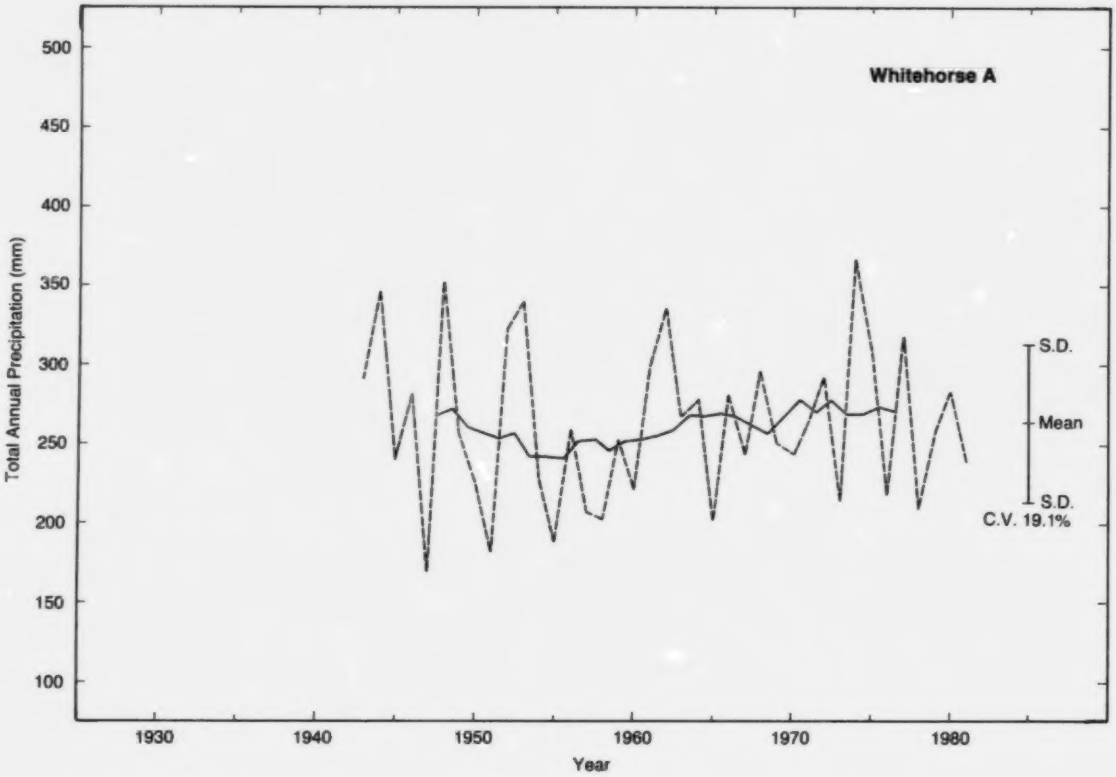


Figure 9.45 Whitehorse A year-to-year total annual precipitation variation and ten-year running means

10. SUNSHINE, CLOUD, VISIBILITY AND OBSTRUCTIONS TO VISION

10.1 Sunshine

In Canada, bright sunshine observations are made using the Campbell-Stokes sunshine recorder. The sun's rays are focused on a card and must be of sufficient intensity to scorch or burn the card in order to be recorded. This recorded "duration of bright sunshine" does not truly represent the duration the sun is visible to the human eye. In spite of this shortcoming the usefulness of these data cannot be questioned.

Total bright sunshine for Yukon stations as well as Banff and Calgary, for comparative purposes, are listed in Table 10.1. These values for Whitehorse, Banff and Calgary are plotted in Figure 10.1. The percentages of possible sunshine (sunshine that would be received at a station on level terrain under clear skies) at Whitehorse, Banff and Calgary are displayed in Table 10.2. Of the four Yukon locations with observations, Whitehorse records the brightest skies on an annual basis while Watson Lake shows the lowest; yet in certain months like July, October and December Watson Lake has more sunshine (Table 10.1). Ft. Selkirk on the average records only 7.7 and 7.5 hours respectively in December and January, under 5% of the possible sunshine. Haines Junction has an extremely dull December with an average value of only 1.7 hours of bright sunshine, mainly due to the low sun angle and the shading effect of the Auriol Mountains to the south.

Whitehorse is brighter than both Banff and Calgary in April, May and June (Figure 10.1). There is more possible sunlight available to Whitehorse in these months due to its latitude and it receives over 50% of the possible while the southern locations receive about 40% of their possible values (Table 10.2). Whitehorse is less bright than the other two in the fall and early winter mainly due to cloud generated by moisture from open lakes and rivers in the Yukon River basin.

10.2 Cloud

Until only recently the observation of cloud amount and type was strictly a subjective estimate on the part of the observer. The accuracy of these observations was reduced by some clouds being obscured by other lower clouds, or by fog, rain or snow. Night-time observations were further hindered by the usual night vision problems of discernment, depth perception, lack of contrast, and just plain darkness.

10.2.1 *Cloud Amount*

An examination of diurnal cloud cover by month (Tables 10.3-10.14) shows the general distribution of mean cloud amount. Yukon tends to be somewhat on the cloudy side, partly because of its mountainous terrain which promotes more instability cloud in summer as well as cold autumn air traversing open lakes and rivers which promotes low cloudiness prior to freeze-up in the fall and early winter. In the previous section it was noted that Whitehorse has brighter skies than some southern locations in spring, especially in April – the driest month in Yukon. Mean cloud amounts range mostly from four-tenths to eight tenths.

Many locations exhibit two annual maxima: the first in early summer (June-July and sometimes in May as well, likely when the snow leaves early); the second in the fall (September, October and November continuing to freeze-up). Similarly two minima occur: the primary one in winter (January to March but often including December and April as well, partly due to the dominance of anticyclonic circulation over the interior) and a minor minimum in late summer, particularly in August. The diurnal maximum of cloud amounts generally occurs around mid-day or slightly later and the minimum in the wee hours of the morning.

Cloud amounts, especially of low cloud, are closely tied to the wind direction. Tables 10.15 to 10.27 give the relationships between total cloud amount and wind direction from two separate aspects. The first number gives the actual percentage of cloud amounts by class and by wind direction. The second, bracketed figures are the percentage frequency of occurrence of that sky condition class for the specified wind direction. The class definitions are based on overcast (10/10), broken (6/10-9/10), scattered (nil to 5/10) as defined for aviation purposes except that the scattered here includes clear skies. Looking first at the total winter percentages for each class, most places show a high percentage of scattered cloud, generally over 40% of the time. A few places show also a high or slightly higher percentage of overcast conditions, such as at Dawson, Dawson A, Mayo and Watson Lake. That is, in general, it is either overcast or only scattered cloud prevails.

The same pattern continues through spring, except on the Arctic coast, cloud cover is more dependent on whether the wind is onshore or offshore regardless of season. The general pattern reverses in the summer when the highest percentages of broken cloud occur, which is consistent with the fact that summer instability cloud contributes most to the total precipitation, particularly in valley locations where most of the observations are made. The fall brings a shift towards overcast conditions at most locations except those in the western and southwestern reaches of the Yukon River basin, where the distribution of cloud among the three classes is relatively even. This is coincident with the fact that freeze-up occurs last in the southwestern Yukon.

The largest percentage of cloud in all categories occurs for the directions of the prevailing wind, which is to be expected. The bracketed numbers in Tables 10.15 to 10.27 give us a look at the distribution of cloud amounts for a particular direction. For example, at Whitehorse (Table 10.27), for north winds in winter, 47.5% of the time the sky is overcast, 27.5% of the time it is broken and 25% of the time scattered. One could therefore conclude that when the wind blows from the north at Whitehorse they sky is overcast almost half the time or that 75% of the time it is cloudy (>50% of sky covered).

Figures 10.2 to 10.14 depict this distribution of cloud amounts by wind direction graphically including the distribution for calm winds. Seasonal changes in the percentage occurrence of each class for each wind direction are readily apparent. For example, Burwash (Figure 10.4) shows a high percentage of scattered conditions in winter, especially with a southwest wind. This percentage falls through spring to a minimum in summer with compensating changes in the percentage of broken cloud conditions. Interestingly, the seasonal fluctuations of overcast conditions are relatively small. They remain roughly between 15 and 25% with north through east winds, but rise to 35 to 45% for west and northwest winds except in autumn when they rise over 50%.

The dependence of sky condition on wind direction becomes very obvious in these figures. Komakuk Beach (Figure 10.8), and Shingle Point (Figure 10.9) show a very marked tendency towards only a few clouds with the winds east through southwest and with calm winds during the winter months. This tendency is modified only slightly in spring but much more so in summer when open water prevails offshore. Autumn again sees a reduction in cloud amount with southerly winds, but a great increase in overcast skies with west to northeast winds as cold moist air blows off the relatively warm, still unfrozen Beaufort Sea.

10.3 Fog

Fog in Yukon is essentially a fall-early winter phenomenon. Though there are some occurrences in summer these are relatively few. Reference to Tables 10.28 to 10.41 will show the occurrences of fog/ice fog by month and by hour of the day for the period of record for each station (for up to 30 years of record). It is soon evident that fog is relatively uncommon March to July, increasing in the fall particularly in November reaching a peak in December or January, when there is still some open water available to provide a moisture source. In all cases the occurrences of fog drop sharply in February when virtually all natural water sources freeze over. During very cold weather ice fog can occur but mainly in communities where local moisture sources prevail.

Diurnally, the maximum number of occurrences of fog is usually around 6:00 or 7:00 a.m. local time, though it occasionally occurs as early as 4:00 or as late as 10:00 (Tables 10.28 to 10.41). Nearly every station shows minima during the afternoon – often showing no occurrences at all from late morning to evening from March to August.

The foggiest location, of those stations that report 24 hours a day, is Dawson (Table 10.31) with weighted average (based on the number of years of observations for each hour), of 626 occurrences of fog per year. Dawson A and Watson Lake (Tables 10.32 and 10.40) both show 310 occurrences per year; Snag (Table 10.38) follows with 271 and then Aishihik with 219 (Table 10.28). Teslin is the lowest of the 24-hour stations with a mere 100 occurrences per year. The 3-hourly reporting stations generally have a different number of years of observations for different hours of the day and for different months of the year. However, a quick look at Shingle Point (Table 10.37, where the main synoptic hours have 8 years of observations and the intermediate synoptic hours have one year May to December and two years January to April) gives an annual average of 936 hours. The same approach at Komakuk Beach gives 1044 hours of fog for the year (Table 10.35).

Fog or ice fog does not occur frequently outside of settlement areas because of a lack of moisture in the very cold air. It is usually found around settlements, primarily as the natural consequence of the input of moisture and condensation nuclei into the air through the burning of fossil fuel for space heating and transportation. With frequent light or calm winds and the ubiquitous arctic inversion, this fog/ice fog tends to persist once it is formed.

10.4 Ceilings and Visibility

For aviation purposes knowledge of the presence of cloud or fog is not enough. It is necessary to know the height of the cloud base and the density of the fog. Criteria for take off and landing at various aerodromes are based upon two parameters in conjunction, ceiling and visibility. The ceiling is defined as the lowest height (of the base of the cloud) above the aerodrome at which 6/10 or more of the sky is obscured by cloud. Visibility is the horizontal distance at which objects or normal lights are discernible. While these definitions may not be strictly precise, they are sufficient for this discussion.

Figures 10.15 to 10.28 show graphically the monthly percentage distribution, for various wind speed classes, of specified ceiling/visibility combinations. These combinations have been chosen to represent common aviation criteria for aircraft operations. Note that the colour code for wind and speed classes is changed for Shingle Point and Komakuk Beach to cover the generally higher wind speeds at those two locations.

In general, as the ceiling/visibility increases a smaller percentage of cases occur with calm and light winds (≤10km/hr) and a correspondingly larger percentage occur with "medium" speeds (11 to 30km/hr). There does not seem to be any particular pattern to the greater than 30km/hr wind speed class, but this may be due in part to the relatively few cases (except on the Arctic coast) of wind speeds in this category (section 7.2.3).

For all locations, except the Arctic coast, the figures show similar profiles. Calm and light winds (≤10km/hr) are associated with a large portion of the lowest ceiling/visibility category (<60m/0.8km). In winter and again in late summer/early autumn this portion is greatest. In spring/early summer and in late autumn the percentage of higher wind speeds associated with low ceiling/visibility increases. Similar patterns hold for the other ceiling/visibility categories but with progressively lower percentages of calm winds.

For Komakuk Beach (Figure 10.22) and Shingle Point (Figure 10.24), the wind speeds are consistently higher necessitating an adjustment of wind speed ranges. The colour progression has been reversed in these figures so as to avoid possible confusion with those from the other stations. The higher winter wind speeds are evident as well as the dramatic difference in low ceiling/visibility versus wind class from summer to winter. From November to March a significant percentage of low ceiling/visibility events occurs with strong winds. For example, in the 60m/0.8m category, up to 50% of the occurrences are with winds greater than 50km/hr (27 kt or 31 mph) at Shingle Point and up to 30% at Komakuk Beach. These percentages diminish for higher ceiling/visibility categories indicating that much of the reduction in category is the result of snow and blowing snow being swept in from the frozen Beaufort Sea to the north. This can be readily seen in Tables 10.41 to 10.51, which depict blowing snow events at selected stations.

10.5 Blowing Snow

The number of observations of blowing snow for each month by hour of the day is shown in Tables 10.41 to 10.51. The incidence of blowing snow is relatively small, except over the north slope. Dawson, in 24 years recorded blowing snow 313 times (0.15% of the time) while Whitehorse, in 30 years, 275 times (0.1% of the time). Other locations show even less frequency.

The Arctic coast shows a different regime. If we examine the main synoptic hours only (since these are the only ones that have a significant period of record) we find that Komakuk Beach has had 1477 hours of blowing snow in 10 years (10.1% of the time) and Shingle Point with 784 hours in 10 years (5.4% of the time). These higher percentages than elsewhere in Yukon are due to a number of factors: lack of vegetation, longer winter (snowfall) season and the highest mean wind speeds in Yukon. Although this area experiences the most widespread blowing snow, the most severe blizzards are with outflow winds in local valleys such as the Blow River and at the foot of glaciers as discussed in section 7.2.6.

TABLE 10.1

Total Bright Sunshine (Hours) 1951 – 80

	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
Fort Selkirk	7.5	91.2	168.2	229.7	281.8	280.0	268.0	246.8	142.9	79.7	16.4	7.7	1819.9
Haines Junction	19.3	78.0	161.4	220.7	282.8	275.7	275.4	235.9	139.8	91.5	24.4	1.7	1806.6
Watson Lake A	45.1	85.3	134.8	216.6	255.2	265.0	262.6	228.0	126.5	95.6	42.9	31.3	1788.9
Whitehorse A	46.0	91.0	153.1	229.6	259.2	272.8	250.2	230.7	136.5	93.4	58.3	23.0	1843.8
Banff	55.5	93.0	133.8	154.4	196.2	204.0	255.6	211.1	163.3	131.5	81.4	39.2	1724.0
Calgary Int'l A	102.0	127.9	162.2	204.9	253.6	267.0	322.2	282.3	194.7	176.0	123.9	97.7	2314.4

TABLE 10.2

Approximate Average Percentage of Possible Sunshine at Whitehorse, Banff and Calgary

	APRIL	JULY	OCTOBER	DECEMBER
Whitehorse	52	44	30	13
Banff	39	51	40	18
Calgary A	43	62	49	38

TABLE 10.3

Mean Total Cloud Amount for Each Hour by Month

STATION: Aishihik (1953 – 1966)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Mean
JAN.	5	5	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	6	5	5	5	5	5	5	5
FEB.	5	5	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	6	6	5	5	5	5	6
MAR.	4	4	4	4	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	5	4	5
APR.	4	4	4	4	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	5	4	5
MAY	5	5	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	6	6	6	6	5	6
JUN.	6	6	6	6	7	7	7	7	7	7	7	7	8	8	8	8	8	7	7	7	7	7	6	6	7
JUL.	7	7	7	7	7	7	7	7	7	7	7	7	7	8	8	8	7	7	7	7	7	7	7	7	7
AUG.	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	7
SEP.	5	5	5	5	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	5	6
OCT.	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	6	6	6
NOV.	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	6	6	6	6	6	6	6
DEC.	5	5	5	5	5	5	5	5	6	6	7	7	7	7	7	7	6	6	6	5	5	5	5	5	6
ANN.	5	5	5	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	6	6	6	6	6	5	6

TABLE 10.4

Mean Total Cloud Amount for Each Hour by Month

STATION: Beaver Creek (1968 – 1977)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Mean
JAN.	5	5		4	5		4	5		5	6		5	6		5	6		4	6		4	5		5
FEB.	2	4		3	4		4	4		6	6		6	6		5	6		5	6		3	4		5
MAR.	5	4		4	4		5	5		5	6		5	5		5	6		5	6		4	5		5
APR.	7	6		7	5		7	7		6	6		6	6		7	6		6	6		7	6		6
MAY	6	6		6	6		7	7		6	7		7	7		7	8		7	8		6	7		7
JUN.	7	7		7	6		6	7		6	7		7	7		7	7		7	7		8	7		7
JUL.	7	7		6	7		7	7		7	7		7	7		7	7		7	7		8	7		7
AUG.	6	6		6	6		7	6		7	6		7	6		7	6		7	7		7	7		7
SEP.	5	5		5	5		7	6		7	6		7	6		7	7		7	7		6	6		6
OCT.	6	6		6	6		6	7		8	8		7	7		7	7		7	7		7	7		7
NOV.	5	5		5	5		5	5		7	6		6	6		6	6		6	6		5	5		6
DEC.	5	5		5	5		5	5		6	6		6	6		7	6		5	5		5	5		5
ANN.	6	5		6	5		6	6		6	6		6	6		7	7		6	6		6	6		

TABLE 10.5

Mean Total Cloud Amount for Each Hour by Month

STATION: Dawson A (1976 – 1981)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Mean
JAN.	6	6	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6
FEB.	4	4	5	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	6	5	5	5	4	4	5
MAR.	5	5	5	5	5	5	6	6	7	7	7	6	6	6	6	6	6	6	6	6	6	6	5	5	6
APR.	4	4	4	4	5	5	6	6	6	6	6	6	6	6	6	7	7	7	7	6	6	6	5	5	6
MAY	6	6	5	6	6	6	6	6	6	6	6	6	7	7	7	7	8	8	7	7	7	6	6	6	6
JUN.	6	6	6	6	6	7	7	7	7	7	7	7	7	7	8	8	8	8	8	8	7	7	7	7	7
JUL.	7	7	6	6	7	7	7	7	7	7	7	7	7	7	7	8	8	8	7	7	7	7	7	7	7
AUG.	5	5	5	5	5	6	6	7	7	7	6	6	6	7	7	7	7	7	7	7	7	6	6	5	6
SEP.	6	6	6	6	6	7	7	8	8	8	8	8	8	8	8	8	8	8	8	7	7	7	6	6	7
OCT.	7	7	7	7	8	8	8	8	8	9	8	8	8	8	8	8	8	8	8	8	7	7	8	7	8
NOV.	7	7	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	8	7	7	7	7	7	7	8
DEC.	6	6	6	6	6	6	6	6	6	6	6	7	7	7	7	7	7	6	6	6	6	6	6	6	6
ANN.	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	7

TABLE 10.6

Mean Total Cloud Amount for Each Hour by Month

STATION: Faro (1972 1977)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Mean
JAN.					5			5			7			7			7			5			6		6
FEB.					5			5			7			6			6			6					6
MAR.					5			6			7			6			7			6					6
APR.					5			7			7			7			8			7					7
MAY					6			7			7			8			8			7					7
JUN.					7			7			7			8			8			8			7		7
JUL.					7			7			7			7			8			8			7		7
AUG.					6			7			7			7			8			8			7		7
SEP.					6			7			7			7			7			7			6		7
OCT.					7			8			8			8			8			8			6		8
NOV.					5			6			8			7			7			6			5		6
DEC.					6			6			7			7			7			6			5		7
ANN.					6			7			7			7			7			7			6		7

TABLE 10.7

Mean Total Cloud Amount for Each Hour by Month

STATION: Komakuk Beach A (1973 – 1981)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Mean
JAN.	5			5			5			5			5			7			6			6			5
FEB.	4			4			4			5			5			6			5			6			5
MAR.	3			3			3			3			5			4			4			4			4
APR.	4			4			4			5			5			5			4			5			4
MAY	7			8			7			8			7			7			7			8			7
JUN.	7			7			7			7			7			6			6			6			7
JUL.	6			5			7			7			7			5			6			5			6
AUG.	7			6			7			6			7			6			7			6			7
SEP.	7			6			7			7			8			7			7			7			7
OCT.	7			6			7			7			8			8			8			7			7
NOV.	5			6			5			6			6			7			6			5			6
DEC.	4			4			4			4			5			5			5			4			5
ANN.	6			5			6			6			6			6			6			6			6

TABLE 10.8

Mean Total Cloud Amount for Each Hour by Month

STATION: Mayo A (1953 – 1981)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Mean
JAN.	5	5	6	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	5	5	5	5	5	5	6
FEB.	5	4	4	5	5	5	5	6	6	7	7	7	7	6	6	6	6	6	6	6	5	5	5	5	6
MAR.	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	6	5	6
APR.	5	5	5	5	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	6	6	6	5	6
MAY	6	6	6	6	6	6	6	6	6	6	7	7	7	7	8	7	8	7	7	7	7	7	6	6	7
JUN.	6	6	6	6	6	6	6	6	6	7	7	7	7	8	8	8	8	8	7	7	7	7	7	7	7
JUL.	6	6	6	7	7	7	7	7	7	7	7	7	7	7	8	8	8	7	7	7	7	7	7	7	7
AUG.	6	5	5	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	7
SEP.	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	7
OCT.	7	7	7	6	7	7	7	8	8	8	8	8	8	8	8	8	8	8	8	7	7	7	7	7	8
NOV.	7	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	7	7
DEC.	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	6	6	6	6	6	6	6	6
ANN.	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	7

TABLE 10.9

Mean Total Cloud Amount for Each Hour by Month

STATION: Old Crow (1975 – 1978)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Mean
JAN.																									
FEB.																									
MAR.																									
APR.								3	4	4	4	5	5	5			4			3					4
MAY								5	5	5	5	6	6	6			5			5					5
JUN.																									
JUL.								5	5	5	5	6	6	6			6	7		6			6		6
AUG.								7	6	6	6	6	6	7			7			7			6		6
SEP.								8	8	7	7	7	7	7			7			7			5		7
OCT.								8	9	8	9	8	8	8			8			8			7		8
NOV.								4	4	5	5	6	5	6			6			4			2		5
DEC.																									
ANN.																									

TABLE 10.10

Mean Total Cloud Amount for Each Hour by Month

STATION: Shingle Point A (1973 – 1981)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Mean
JAN.	5			4			4			5			5			7			6			5			5
FEB.	4			5			4			6			6			6			5			5			5
MAR.	4			3			3			4			4			4			4			4			4
APR.	5			4			5			6			5			6			5			5			5
MAY	7			7			7			8			7			8			7			7			7
JUN.	7			6			7			6			7			6			7			6			7
JUL.	7			5			7			6			7			5			6			6			7
AUG.	7			5			7			5			7			5			7			6			7
SEP.	7			6			7			8			8			8			8			8			7
OCT.	7			8			7			8			8			8			8			8			8
NOV.	5			6			5			6			7			7			6			6			6
DEC.	5			4			5			6			6			7			6			5			6
ANN.	6			5			6			6			7			6			6			6			6

TABLE 10.11

Mean Total Cloud Amount for Each Hour by Month

STATION: Snag A (1953 – 1966)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Mean
JAN.	5	5	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	5	6
FEB.	5	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	6	6
MAR.	5	5	5	5	5	6	6	6	7	7	6	6	6	6	6	6	6	6	6	6	6	5	5	5	6
APR.	5	5	5	5	6	6	6	7	6	6	6	6	6	6	7	7	7	7	7	7	6	6	6	5	6
MAY	7	6	7	7	7	7	7	7	7	7	7	7	7	8	8	8	8	8	7	7	7	7	7	7	7
JUN.	7	7	7	7	7	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	7	8	7	7	7
JUL.	7	7	7	7	8	8	8	8	8	7	7	7	7	8	8	8	8	8	7	7	7	8	7	7	7
AUG.	6	6	6	7	7	7	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	7
SEP.	6	6	6	6	6	7	7	8	8	8	7	7	7	7	7	7	8	7	7	7	7	6	6	6	7
OCT.	7	7	7	7	7	7	7	8	8	8	8	8	8	8	7	7	7	7	7	7	7	6	6	6	7
NOV.	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	7	7
DEC.	6	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	6	6	6	6	6	6	6
ANN.	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	7

TABLE 10.12

Mean Total Cloud Amount for Each Hour by Month

STATION: Teslin A (1953 – 1981)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Mean
JAN.	5	5	5	5	5	5	5	6	6	6	6	6	6	7	6	6	6	6	5	5	5	5	5	5	6
FEB.	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	6	6	6	6	5	5	6
MAR.	5	6	6	5	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	6	6	5	5	5	6
APR.	5	5	5	5	5	6	6	6	6	6	6	7	7	7	7	7	7	7	7	6	6	5	5	4	6
MAY	5	5	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	5	7
JUN.	6	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	6	6	5	7
JUL.	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	7
AUG.	5	5	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	5	7
SEP.	6	6	6	6	7	7	7	7	7	7	7	7	8	8	8	8	8	8	7	7	6	6	6	6	7
OCT.	6	6	6	7	7	7	7	8	8	8	8	8	8	8	8	8	8	8	7	7	6	6	6	6	7
NOV.	7	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	7	7
DEC.	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	6	6	6	6	6	6	6	6	7
ANN.	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	6	6	7

TABLE 10.13

Mean Total Cloud Amount for Each Hour by Month

STATION: Watson Lake A (1953 – 1981)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Mean
JAN.	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	6	6	6	6	6	6	7
FEB.	6	6	7	7	7	7	7	7	8	8	8	8	8	8	7	8	7	7	7	7	6	6	6	6	7
MAR.	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	7
APR.	5	5	6	6	6	7	7	7	7	7	7	7	7	7	8	8	8	7	7	7	6	6	6	5	7
MAY	6	6	6	7	7	7	7	7	7	7	7	8	8	8	8	8	8	8	7	7	7	7	7	6	7
JUN.	7	7	7	7	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	8	7	7	7	7	7
JUL.	7	7	7	7	7	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	7	7	7	7	7
AUG.	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	7
SEP.	6	7	7	7	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	7	7	7	6	6	7
OCT.	7	7	7	7	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	7	7	7	7	7	8
NOV.	7	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	7	7
DEC.	7	7	7	7	7	7	7	7	7	7	8	8	8	8	7	7	7	7	7	7	7	7	7	7	7
ANN.	6	6	7	7	7	7	7	7	7	7	7	7	8	8	8	8	8	7	7	7	7	7	7	6	7

TABLE 10.14

Mean Total Cloud Amount for Each Hour by Month

STATION: Whitehorse A (1953 – 1981)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Mean
JAN.	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	6	6
FEB.	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	6	7
MAR.	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	6
APR.	5	5	5	5	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	5	6
MAY	6	6	6	6	6	6	6	6	6	7	7	7	7	8	7	7	7	7	7	7	7	7	6	6	7
JUN.	6	6	6	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	7	7	7	7	7	7	7
JUL.	7	7	7	7	7	7	7	7	7	7	7	7	7	8	8	8	8	8	8	7	7	7	7	7	7
AUG.	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	7
SEP.	6	6	6	6	6	7	7	7	7	8	8	8	8	8	8	8	8	8	8	7	7	7	7	6	7
OCT.	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	8	8	8	7	7	7	7	7	7	7
NOV.	7	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	7
DEC.	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
ANN.	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	7

TABLE 10.15

Frequency of Cloud Amounts by Class and Wind Direction

STATION: Aishihik A (1953 – 1966)

CONDITION	% WINTER	% SPRING	% SUMMER	% AUTUMN
OVC TOTAL	29.9	23.1	25.0	31.4
OVC N	8.8 (42.3)	5.0 (37.6)	3.9 (33.9)	10.6 (48.2)
OVC NE	3.6 (38.7)	2.1 (30.4)	1.8 (30.0)	4.1 (39.8)
OVC E	0.4 (25.1)	0.5 (24.4)	0.7 (28.0)	0.7 (36.0)
OVC SE	1.7 (29.3)	3.7 (25.5)	4.7 (26.6)	3.1 (32.3)
OVC S	4.5 (23.8)	5.6 (18.7)	7.6 (24.0)	4.5 (20.9)
OVC SW	2.3 (23.0)	1.9 (16.0)	3.1 (23.5)	2.1 (18.8)
OVC W	0.7 (25.6)	0.6 (19.4)	1.0 (22.4)	0.8 (17.4)
OVC NW	1.5 (35.7)	1.6 (26.2)	1.9 (30.6)	1.7 (35.4)
OVC CALM	6.5 (24.2)	2.1 (17.2)	1.7 (21.5)	3.7 (26.6)
BKN TOTAL	26.2	33.6	45.8	32.8
BKN N	5.1 (24.5)	4.4 (33.1)	5.5 (47.8)	5.9 (26.8)
BKN NE	2.5 (26.9)	2.2 (31.9)	2.8 (46.7)	3.1 (30.1)
BKN E	0.4 (27.2)	0.7 (34.2)	1.2 (48.0)	0.6 (31.2)
BKN SE	1.8 (31.0)	5.3 (36.6)	7.8 (44.1)	3.6 (37.5)
BKN S	5.6 (29.6)	11.0 (36.7)	14.4 (45.4)	8.9 (41.4)
BKN SW	2.9 (29.0)	3.5 (24.9)	5.7 (43.2)	3.8 (33.9)
BKN W	0.7 (25.6)	1.1 (35.5)	2.2 (47.1)	1.4 (30.4)
BKN NW	1.0 (23.8)	2.4 (39.3)	3.1 (50.0)	1.5 (31.3)
BKN CALM	6.3 (23.4)	2.9 (23.7)	3.2 (40.5)	3.9 (28.1)
SCT TOTAL	43.8	43.4	29.2	35.9
SCT N	6.9 (33.2)	3.9 (29.3)	2.1 (18.2)	5.5 (25.0)
SCT NE	3.2 (34.4)	2.6 (37.7)	1.4 (23.3)	3.1 (30.1)
SCT E	0.7 (47.7)	0.8 (41.3)	0.6 (24.0)	0.7 (32.8)
SCT SE	2.3 (39.7)	5.5 (37.9)	5.2 (29.4)	2.9 (30.2)
SCT S	8.8 (46.6)	13.4 (44.0)	9.7 (30.6)	8.1 (37.7)
SCT SW	4.8 (48.0)	6.5 (54.6)	4.4 (33.3)	5.3 (47.3)
SCT W	1.3 (48.9)	1.4 (45.2)	1.4 (30.4)	2.4 (52.2)
SCT NW	1.7 (40.4)	2.1 (34.4)	1.2 (19.4)	1.6 (33.3)
SCT CALM	14.1 (52.4)	7.2 (59.0)	3.0 (38.0)	6.3 (45.3)

TABLE 10.16

Frequency of Cloud Amounts by Class and Wind Direction

STATION: Beaver Creek (1968 – 1977)

CONDITION	% WINTER	% SPRING	% SUMMER	% AUTUMN
OVC TOTAL	28.1	26.0	26.7	34.6
OVC N	3.2 (40.0)	2.8 (31.5)	3.5 (24.8)	4.9 (40.5)
OVC NE	2.3 (37.1)	1.5 (22.7)	1.1 (14.3)	1.5 (27.3)
OVC E	0.3 (27.1)	1.0 (23.3)	0.8 (17.8)	0.6 (23.1)
OVC SE	0.5 (23.5)	2.3 (23.0)	1.6 (19.8)	1.5 (26.8)
OVC S	1.4 (18.6)	3.2 (16.7)	3.5 (21.5)	2.3 (20.7)
OVC SW	0.5 (31.6)	1.4 (24.6)	2.4 (32.9)	1.0 (32.4)
OVC W	0.5 (34.4)	3.4 (37.4)	4.0 (41.2)	2.8 (50.3)
OVC NW	2.2 (53.7)	4.3 (43.4)	3.6 (32.7)	5.0 (59.5)
OVC CALM	17.2 (25.4)	6.2 (25.2)	6.1 (29.0)	12.4 (28.1)
BKN TOTAL	23.1	34.8	42.3	29.0
BKN N	2.4 (30.0)	2.4 (27.0)	6.2 (43.9)	3.9 (32.2)
BKN NE	1.6 (25.8)	2.8 (42.4)	3.5 (45.5)	1.9 (34.5)
BKN E	0.2 (22.0)	1.9 (44.2)	2.0 (44.4)	1.1 (42.3)
BKN SE	0.5 (22.7)	4.0 (40.0)	3.8 (46.9)	2.0 (35.7)
BKN S	1.6 (21.3)	6.0 (31.3)	6.7 (41.1)	3.4 (30.6)
BKN SW	0.4 (25.5)	2.3 (40.4)	3.2 (43.8)	1.0 (31.9)
BKN W	0.4 (28.7)	3.2 (35.2)	3.8 (39.2)	1.2 (26.2)
BKN NW	1.2 (29.3)	3.3 (33.3)	5.2 (47.3)	2.0 (23.8)
BKN CALM	14.7 (21.7)	7.1 (28.9)	7.8 (37.1)	12.5 (28.3)
SCT TOTAL	48.8	39.2	31.1	36.4
SCT N	2.4 (30.0)	3.7 (41.6)	4.4 (31.2)	3.3 (27.3)
SCT NE	2.3 (37.1)	2.3 (38.4)	3.1 (40.3)	2.1 (38.2)
SCT E	0.5 (50.8)	1.4 (32.6)	1.7 (37.8)	0.9 (34.6)
SCT SE	1.3 (53.8)	3.7 (37.0)	2.7 (33.3)	2.1 (37.5)
SCT S	4.5 (60.0)	10.0 (52.1)	6.1 (37.4)	5.4 (48.6)
SCT SW	0.7 (42.9)	2.0 (35.1)	1.7 (23.3)	1.2 (35.7)
SCT W	0.6 (36.8)	2.5 (27.5)	1.9 (19.6)	0.9 (17.5)
SCT NW	0.7 (17.1)	2.3 (23.2)	2.2 (20.0)	1.4 (16.7)
SCT CALM	35.7 (52.8)	11.3 (45.9)	7.1 (33.8)	19.2 (43.5)

(Bracketed Numbers – Percentage Frequency of a Given Sky Condition for Each Specified Direction)

TABLE 10.17

Frequency of Cloud Amounts by Class and Wind Direction

STATION: Burwash A (1966 – 1981)

CONDITION	% WINTER	% SPRING	% SUMMER	%AUTUMN
OVC TOTAL	24.4	21.8	23.9	32.2
OVC N	0.1 (18.3)	0.2 (21.1)	0.3 (21.3)	0.2 (28.9)
OVC NE	0.1 (17.5)	0.4 (23.4)	0.3 (14.3)	0.1 (12.2)
OVC E	1.8 (17.8)	5.9 (17.5)	6.0 (17.1)	3.3 (20.9)
OVC SE	1.0 (14.9)	2.4 (16.8)	3.8 (21.5)	4.4 (21.6)
OVC S	0.1 (12.1)	0.2 (15.5)	0.3 (21.3)	0.2 (16.4)
OVC SW	0.1 (9.1)	0.3 (19.9)	0.6 (31.6)	0.2 (18.3)
OVC W	11.1 (40.4)	6.0 (37.5)	5.5 (41.4)	14.9 (51.0)
OVC NW	2.9 (44.6)	2.0 (38.4)	2.0 (34.5)	4.1 (52.6)
OVC CALM	7.3 (15.8)	4.4 (17.3)	5.1 (23.4)	5.0 (21.5)
BKN TOTAL	27.4	37.0	45.4	31.1
BKN N	0.2 (31.7)	0.5 (42.3)	0.8 (56.9)	0.2 (34.3)
BKN NE	0.2 (34.3)	0.6 (40.9)	0.9 (51.7)	0.2 (42.9)
BKN E	3.6 (35.6)	13.9 (41.1)	16.0 (45.6)	6.5 (41.1)
BKN SE	2.8 (41.8)	6.3 (44.0)	8.4 (47.5)	8.0 (39.2)
BKN S	0.2 (30.4)	0.5 (45.7)	0.7 (54.8)	0.4 (33.0)
BKN SW	0.2 (18.8)	0.6 (39.3)	0.9 (47.4)	0.3 (28.1)
BKN W	7.2 (26.2)	5.6 (35.0)	5.9 (44.4)	7.0 (23.9)
BKN NW	1.7 (26.2)	2.2 (42.3)	3.0 (51.7)	2.2 (28.2)
BKN CALM	11.3 (24.4)	6.9 (27.1)	8.8 (40.4)	6.2 (26.6)
SCT TOTAL	48.2	41.1	30.7	36.6
SCT N	0.2 (50.0)	0.4 (33.6)	0.3 (21.8)	0.2 (36.8)
SCT NE	0.2 (48.2)	0.5 (35.8)	0.6 (33.9)	0.2 (44.8)
SCT E	4.7 (46.5)	14.0 (41.4)	13.1 (37.3)	6.0 (38.0)
SCT SE	2.9 (43.3)	5.6 (39.2)	5.5 (31.1)	8.0 (39.2)
SCT S	0.4 (57.4)	0.4 (38.7)	0.3 (23.9)	0.6 (50.6)
SCT SW	1.0 (72.1)	0.6 (40.8)	0.4 (21.1)	0.6 (53.5)
SCT W	9.2 (33.5)	4.4 (27.5)	1.9 (14.3)	7.3 (25.0)
SCT NW	1.9 (29.2)	1.0 (11.2)	0.8 (13.8)	1.5 (19.2)
SCT CALM	27.7 (59.8)	14.2 (55.7)	7.9 (36.2)	12.1 (51.9)

TABLE 10.18

Frequency of Cloud Amounts by Class and Wind Direction

STATION: Dawson (1953 – 1976)

CONDITION	% WINTER	% SPRING	% SUMMER	% AUTUMN
OVC TOTAL	41.1	26.1	25.3	47.9
OVC N	8.8 (66.2)	7.4 (29.8)	4.0 (23.8)	12.4 (63.6)
OVC NE	3.1 (43.7)	2.4 (18.9)	1.5 (17.2)	3.1 (43.7)
OVC E	0.2 (41.6)	0.4 (22.2)	0.5 (20.8)	0.5 (37.9)
OVC SE	0.7 (54.3)	0.9 (25.0)	1.4 (28.6)	1.7 (50.0)
OVC S	9.7 (44.1)	3.1 (31.0)	4.0 (29.6)	8.7 (45.3)
OVC SW	8.3 (36.6)	4.6 (29.1)	5.6 (25.3)	6.5 (39.4)
OVC W	0.4 (43.4)	0.8 (30.4)	0.7 (21.2)	0.8 (44.4)
OVC NW	1.0 (51.7)	1.2 (28.6)	1.3 (31.0)	3.6 (62.1)
OVC CALM	8.8 (29.2)	5.3 (21.5)	6.2 (25.7)	10.5 (41.5)
BKN TOTAL	19.4	29.4	41.8	22.5
BKN N	2.2 (16.5)	7.8 (31.5)	7.9 (47.0)	4.1 (21.0)
BKN NE	1.2 (16.9)	3.4 (26.8)	3.3 (37.9)	1.5 (21.1)
BKN E	0.1 (18.3)	0.7 (38.2)	1.1 (45.8)	0.4 (26.5)
BKN SE	0.3 (19.8)	1.5 (41.7)	2.3 (46.9)	0.9 (26.5)
BKN S	4.3 (19.5)	3.4 (34.0)	5.9 (43.7)	4.6 (24.0)
BKN SW	4.9 (21.6)	5.2 (32.9)	9.9 (44.8)	4.4 (26.7)
BKN W	0.2 (20.8)	0.9 (34.3)	1.5 (45.5)	0.6 (33.3)
BKN NW	0.3 (16.6)	1.4 (33.3)	2.0 (47.6)	1.2 (20.7)
BKN CALM	5.9 (19.6)	5.0 (20.3)	7.9 (32.8)	4.9 (19.4)
SCT TOTAL	39.5	44.6	32.9	29.6
SCT N	2.3 (17.3)	9.6 (38.7)	4.9 (29.2)	3.0 (15.4)
SCT NE	2.8 (39.4)	6.9 (54.3)	3.9 (44.8)	2.5 (35.2)
SCT E	0.2 (40.1)	0.8 (39.6)	0.8 (33.3)	0.5 (35.7)
SCT SE	0.4 (25.8)	1.2 (33.3)	1.2 (24.5)	0.8 (23.5)
SCT S	8.0 (36.4)	3.5 (35.0)	3.6 (26.7)	5.9 (30.7)
SCT SW	9.5 (41.8)	6.0 (37.9)	6.6 (29.9)	5.6 (33.9)
SCT W	0.3 (35.7)	0.9 (35.2)	1.1 (33.3)	0.4 (22.2)
SCT NW	0.6 (31.6)	1.6 (38.0)	0.9 (21.4)	1.0 (17.2)
SCT CALM	15.4 (51.2)	14.3 (58.1)	10.0 (41.5)	9.9 (39.1)

TABLE 10.19

Frequency of Cloud Amounts by Class and Wind Direction

STATION: Dawson A (1976 – 1981)

CONDITION	%WINTER	% SPRING	% SUMMER	% AUTUMN
OVC TOTAL	40.5	28.4	26.6	51.2
OVC N	1.4 (66.1)	2.2 (32.8)	1.5 (23.8)	2.5 (56.8)
OVC NE	3.3 (50.0)	4.4 (28.4)	2.1 (21.4)	6.0 (50.0)
OVC E	1.9 (38.0)	3.2 (22.9)	1.4 (20.0)	3.0 (34.5)
OVC SE	0.1 (42.1)	0.3 (23.2)	0.3 (27.8)	0.3 (47.2)
OVC S	0.9 (63.7)	0.9 (28.1)	1.6 (28.6)	1.6 (53.3)
OVC SW	5.0 (66.7)	3.0 (34.9)	4.4 (32.1)	4.7 (58.5)
OVC W	0.7 (60.8)	1.0 (29.4)	1.7 (25.8)	0.8 (48.0)
OVC NW	0.1 (39.1)	0.4 (26.7)	0.5 (25.9)	0.3 (43.8)
OVC CALM	27.3 (35.8)	13.0 (28.2)	13.1 (27.3)	32.1 (52.4)
BKN TOTAL	18.1	31.5	40.2	23.0
BKN N	0.4 (19.0)	2.4 (35.8)	2.9 (46.0)	1.2 (27.3)
BKN NE	1.6 (24.2)	5.1 (32.9)	4.2 (42.8)	2.9 (24.2)
BKN E	1.3 (26.0)	4.5 (32.1)	3.0 (42.8)	2.4 (27.6)
BKN SE	0.0 (26.3)	0.7 (47.0)	0.6 (42.3)	0.2 (31.9)
BKN S	0.3 (18.1)	1.2 (37.5)	2.6 (46.4)	0.8 (26.7)
BKN SW	1.4 (18.7)	3.2 (37.2)	6.2 (45.3)	1.9 (23.8)
BKN W	0.2 (20.2)	1.3 (38.2)	2.8 (42.4)	0.5 (33.2)
BKN NW	0.1 (39.1)	0.5 (36.1)	0.9 (45.9)	0.2 (34.2)
BKN CALM	13.0 (17.1)	12.7 (27.5)	17.2 (35.9)	13.0 (21.2)
SCT TOTAL	41.3	40.1	33.1	25.8
SCT N	0.3 (14.3)	2.1 (31.3)	1.9 (30.2)	0.7 (15.9)
SCT NE	1.7 (25.8)	6.0 (38.7)	3.5 (35.7)	3.1 (25.8)
SCT E	1.8 (36.0)	6.3 (45.0)	2.6 (37.1)	3.3 (37.9)
SCT SE	0.0 (31.5)	0.4 (29.7)	0.3 (25.9)	0.1 (20.8)
SCT S	0.3 (18.1)	1.1 (34.4)	1.4 (25.0)	0.6 (20.0)
SCT SW	1.1 (14.7)	2.4 (27.9)	3.1 (22.6)	1.4 (17.5)
SCT W	0.2 (18.9)	1.1 (32.4)	2.1 (31.8)	0.3 (18.8)
SCT NW	0.0 (21.7)	0.6 (37.1)	0.5 (28.2)	0.1 (21.9)
SCT CALM	35.9 (47.1)	20.4 (44.3)	17.6 (36.7)	16.2 (26.4)

TABLE 10.20

Frequency of Cloud Amounts by Class and Wind Direction

STATION: Faro (1972 – 1977)

CONDITION	% WINTER	% SPRING	% SUMMER	%AUTUMN
OVC TOTAL	32.8	30.7	29.6	39.3
OVC N	0.4 (10.8)	0.7 (23.3)	1.6 (27.1)	0.6 (20.0)
OVC NE	0.5 (18.5)	0.8 (21.4)	1.1 (23.4)	1.3 (31.0)
OVC E	3.9 (34.7)	5.1 (30.0)	2.2 (26.2)	6.0 (42.6)
OVC SE	9.3 (41.9)	8.5 (32.2)	4.9 (27.1)	13.1 (43.0)
OVC S	0.6 (34.8)	1.4 (22.2)	1.1 (16.9)	1.0 (21.7)
OVC SW	0.7 (24.1)	1.5 (13.3)	1.7 (17.2)	1.0 (30.3)
OVC W	3.3 (42.7)	4.7 (40.5)	7.7 (34.4)	4.0 (37.4)
OVC NW	2.7 (32.9)	3.0 (37.5)	5.9 (41.3)	4.5 (46.9)
OVC CALM	11.4 (28.9)	5.1 (30.5)	3.3 (34.0)	7.8 (38.6)
BKN TOTAL	26.4	38.5	46.1	34.4
BKN N	0.9 (24.3)	1.1 (36.7)	2.9 (49.2)	1.1 (36.7)
BKN NE	1.0 (37.0)	1.5 (38.8)	2.1 (44.7)	1.3 (31.0)
BKN E	3.3 (28.9)	6.4 (37.6)	3.7 (44.0)	4.9 (34.8)
BKN SE	5.9 (26.6)	8.8 (33.3)	7.4 (40.9)	10.2 (33.4)
BKN S	0.6 (32.6)	3.3 (52.3)	3.4 (52.3)	1.8 (38.7)
BKN SW	1.2 (41.4)	8.4 (24.3)	6.2 (62.6)	1.5 (45.5)
BKN W	2.2 (28.2)	4.9 (42.4)	10.9 (48.7)	4.5 (42.1)
BKN NW	2.2 (26.8)	3.2 (40.0)	6.5 (45.5)	3.6 (37.5)
BKN CALM	9.1 (23.1)	4.7 (28.1)	2.9 (29.9)	5.6 (27.7)
SCT TOTAL	40.8	30.9	24.4	26.3
SCT N	2.4 (64.9)	1.2 (40.0)	1.4 (23.7)	1.3 (43.3)
SCT NE	1.2 (44.4)	1.5 (39.8)	1.5 (31.9)	1.6 (38.1)
SCT E	4.2 (36.8)	5.5 (32.4)	2.5 (29.8)	3.2 (22.7)
SCT SE	7.0 (31.5)	9.1 (34.5)	5.8 (32.0)	7.2 (23.6)
SCT S	0.6 (32.6)	1.6 (25.4)	2.0 (30.5)	1.8 (39.6)
SCT SW	1.0 (34.5)	1.4 (12.4)	2.0 (20.2)	0.8 (24.2)
SCT W	2.2 (29.1)	2.0 (17.2)	3.8 (17.0)	2.2 (20.6)
SCT NW	3.3 (40.2)	1.8 (22.5)	1.9 (13.3)	1.5 (15.6)
SCT CALM	18.9 (48.0)	6.9 (41.3)	3.5 (36.1)	6.8 (33.7)

TABLE 10.21

Frequency of Cloud Amounts by Class and Wind Direction

STATION: Komakuk Beach A (1973 – 1981)

CONDITION	% WINTER	% SPRING	% SUMMER	% AUTUMN
OVC TOTAL	29.2	30.5	34.0	44.6
OVC N	0.2 (46.7)	0.5 (62.9)	1.7 (35.4)	1.4 (68.9)
OVC NE	0.5 (32.1)	2.7 (60.0)	4.0 (30.1)	1.9 (57.6)
OVC E	7.3 (25.3)	10.6 (29.3)	8.7 (25.8)	11.0 (37.9)
OVC SE	0.2 (11.5)	0.3 (17.3)	0.2 (15.4)	0.9 (28.5)
OVC S	0.1 (9.4)	0.1 (6.7)	0.3 (20.5)	0.6 (15.4)
OVC SW	3.1 (23.1)	1.8 (23.7)	1.0 (30.0)	5.2 (36.6)
OVC W	15.5 (39.2)	11.6 (34.0)	13.2 (48.0)	18.3 (60.2)
OVC NW	0.4 (54.2)	0.7 (53.1)	2.0 (39.2)	1.7 (81.8)
OVC CALM	2.1 (16.3)	2.3 (17.6)	2.8 (30.1)	3.7 (30.6)
BKN TOTAL	16.5	17.5	31.3	20.2
BKN N	0.1 (20.0)	0.1 (11.1)	1.8 (37.5)	0.3 (14.9)
BKN NE	0.2 (10.7)	0.6 (13.3)	4.3 (32.3)	0.5 (15.2)
BKN E	5.3 (18.4)	6.3 (17.4)	9.3 (27.6)	6.0 (20.7)
BKN SE	0.1 (5.8)	0.3 (23.1)	0.6 (38.5)	0.9 (27.7)
BKN S	0.2 (13.2)	0.3 (30.0)	0.6 (45.5)	1.0 (25.6)
BKN SW	1.9 (14.2)	1.1 (14.5)	1.4 (40.0)	3.4 (23.9)
BKN W	6.9 (17.5)	6.6 (19.4)	8.9 (32.4)	5.9 (19.4)
BKN NW	0.1 (20.8)	0.3 (24.5)	1.6 (31.4)	0.3 (14.3)
BKN CALM	1.7 (13.2)	1.9 (14.5)	3.0 (32.3)	2.0 (16.5)
SCT TOTAL	54.3	52.0	34.7	35.2
SCT N	0.1 (33.3)	0.2 (25.9)	1.3 (27.1)	0.3 (16.2)
SCT NE	0.9 (57.1)	1.2 (26.7)	5.0 (37.6)	0.9 (27.3)
SCT E	16.2 (56.3)	19.3 (53.3)	15.7 (46.6)	12.0 (41.4)
SCT SE	1.2 (82.7)	0.9 (59.6)	0.7 (46.2)	1.4 (43.8)
SCT S	1.1 (77.4)	0.5 (63.3)	0.4 (34.1)	2.3 (59.0)
SCT SW	8.4 (62.6)	4.7 (61.8)	1.0 (30.0)	5.6 (39.4)
SCT W	17.1 (43.3)	15.9 (46.6)	5.4 (19.6)	6.2 (20.4)
SCT NW	0.2 (25.0)	0.3 (22.4)	1.5 (29.4)	0.1 (3.9)
SCT CALM	9.1 (70.5)	8.9 (67.9)	3.5 (37.6)	6.4 (52.9)

TABLE 10.22

Frequency of Cloud Amounts by Class and Wind Direction

STATION: Mayo A (1953 – 1981)

CONDITION	% WINTER	% SPRING	% SUMMER	% AUTUMN
OVC TOTAL	35.4	25.7	23.0	41.3
OVC N	7.5 (48.4)	7.0 (27.9)	2.2 (19.6)	11.2 (49.1)
OVC NE	4.7 (50.5)	3.9 (28.3)	1.8 (22.2)	7.0 (47.0)
OVC E	1.7 (51.5)	2.5 (26.9)	1.4 (21.5)	2.9 (42.0)
OVC SE	0.5 (38.4)	0.9 (22.5)	0.7 (21.2)	0.7 (31.8)
OVC S	1.0 (43.5)	1.6 (23.2)	2.1 (22.8)	1.7 (37.8)
OVC SW	2.5 (54.3)	2.4 (27.6)	3.5 (27.6)	3.1 (47.0)
OVC W	1.0 (38.5)	1.0 (22.7)	1.6 (21.6)	1.0 (34.5)
OVC NW	0.5 (41.7)	0.7 (25.9)	0.6 (18.2)	0.8 (38.1)
OVC CALM	15.9 (26.6)	5.7 (22.7)	8.9 (23.5)	12.9 (34.1)
BKN TOTAL	22.9	37.3	47.6	29.7
BKN N	4.0 (25.8)	8.3 (33.1)	5.2 (46.4)	6.4 (28.1)
BKN NE	2.4 (25.8)	4.7 (34.1)	3.7 (45.7)	4.9 (32.9)
BKN E	0.9 (27.3)	3.7 (39.8)	3.2 (49.2)	2.3 (33.3)
BKN SE	0.3 (24.0)	1.7 (42.5)	1.6 (46.4)	0.8 (36.4)
BKN S	0.6 (28.1)	3.3 (47.8)	4.7 (51.1)	1.6 (35.6)
BKN SW	1.0 (21.7)	3.7 (42.5)	6.6 (52.0)	2.1 (31.8)
BKN W	0.6 (23.0)	2.1 (47.7)	4.2 (56.8)	1.0 (34.5)
BKN NW	0.3 (25.0)	1.2 (44.4)	1.8 (54.5)	0.7 (33.3)
BKN CALM	12.7 (21.3)	8.6 (34.3)	16.6 (43.8)	10.6 (28.0)
SCT TOTAL	41.7	37.0	29.3	29.0
SCT N	4.0 (25.8)	9.8 (39.0)	3.8 (33.9)	5.2 (22.8)
SCT NE	2.2 (23.7)	5.2 (37.7)	2.6 (32.1)	3.0 (20.1)
SCT E	0.7 (21.2)	3.1 (33.3)	1.9 (29.2)	1.7 (24.6)
SCT SE	0.5 (37.6)	1.4 (35.0)	1.1 (32.4)	0.7 (31.8)
SCT S	0.7 (30.4)	2.0 (29.0)	2.4 (26.1)	1.2 (26.7)
SCT SW	1.1 (23.9)	2.6 (29.9)	2.6 (20.5)	1.4 (21.2)
SCT W	1.0 (38.5)	1.3 (29.5)	1.6 (21.6)	0.9 (31.0)
SCT NW	0.4 (33.3)	0.8 (29.6)	0.9 (27.3)	0.6 (28.6)
SCT CALM	31.1 (52.1)	10.8 (43.0)	12.4 (32.7)	14.3 (37.8)

TABLE 10.23

Frequency of Cloud Amounts by Class and Wind Direction

STATION: Shingle Point A (1973 – 1981)

CONDITION	% WINTER	% SPRING	% SUMMER	% AUTUMN
OVC TOTAL	33.7	35.7	38.9	51.7
OVC N	1.7 (76.3)	4.2 (71.0)	5.5 (45.5)	3.9 (88.6)
OVC NE	1.2 (66.2)	3.5 (55.6)	4.0 (33.9)	3.5 (77.8)
OVC E	5.0 (28.9)	3.3 (24.4)	3.6 (21.8)	8.2 (47.7)
OVC SE	0.9 (23.7)	0.5 (14.3)	0.5 (12.5)	1.3 (19.7)
OVC S	3.4 (16.9)	1.1 (10.6)	1.7 (15.7)	2.9 (16.0)
OVC SW	2.2 (20.8)	1.0 (16.4)	1.2 (21.8)	2.7 (27.8)
OVC W	11.2 (43.9)	11.3 (33.1)	10.3 (62.0)	14.3 (72.6)
OVC NW	5.6 (69.1)	7.5 (65.8)	9.9 (58.1)	10.6 (81.5)
OVC CALM	3.0 (25.6)	3.3 (23.1)	2.4 (40.7)	4.3 (55.8)
BKN TOTAL	15.6	15.4	26.3	16.4
BKN N	0.1 (8.4)	0.8 (13.6)	3.4 (28.1)	0.4 (9.1)
BKN NE	0.3 (15.4)	1.1 (17.5)	2.9 (24.6)	0.6 (13.3)
BKN E	2.7 (15.6)	2.3 (17.0)	4.3 (26.1)	3.0 (17.4)
BKN SE	0.5 (13.5)	0.5 (14.3)	1.1 (27.5)	2.1 (31.8)
BKN S	3.4 (16.9)	1.3 (12.5)	3.2 (29.6)	3.5 (19.3)
BKN SW	1.4 (13.2)	0.8 (13.1)	1.5 (27.3)	2.2 (22.7)
BKN W	4.6 (18.0)	4.7 (13.8)	3.8 (22.9)	2.8 (14.2)
BKN NW	1.2 (14.8)	1.8 (15.8)	4.5 (26.5)	1.4 (10.8)
BKN CALM	1.9 (16.2)	2.0 (14.0)	1.6 (27.1)	1.3 (16.9)
SCT TOTAL	50.7	48.9	34.7	32.0
SCT N	0.2 (15.3)	0.9 (15.3)	3.2 (26.4)	0.1 (2.3)
SCT NE	0.3 (18.5)	1.7 (27.0)	4.9 (41.5)	0.4 (8.9)
SCT E	9.6 (55.5)	7.9 (58.5)	8.6 (52.1)	6.0 (34.9)
SCT SE	2.4 (63.2)	2.5 (71.4)	2.4 (60.0)	3.2 (48.5)
SCT S	13.3 (66.2)	8.0 (76.9)	5.9 (54.6)	11.7 (64.6)
SCT SW	7.0 (66.0)	4.3 (70.5)	2.8 (50.9)	4.8 (49.5)
SCT W	9.7 (38.0)	18.1 (53.1)	2.5 (15.1)	2.6 (13.2)
SCT NW	1.3 (16.0)	2.1 (18.4)	2.6 (15.3)	1.0 (7.7)
SCT CALM	6.8 (58.1)	9.0 (62.9)	1.9 (32.2)	2.1 (27.3)

TABLE 10.24

Frequency of Cloud Amounts by Class and Wind Direction

STATION: Snag (1953 – 1966)

CONDITION	% WINTER	% SPRING	% SUMMER	% AUTUMN
OVC TOTAL	35.2	29.8	30.8	42.0
OVC N	1.0 (43.5)	1.4 (29.2)	1.5 (20.5)	1.2 (37.5)
OVC NE	1.7 (41.5)	1.4 (27.5)	1.2 (23.1)	1.8 (37.5)
OVC E	4.1 (47.7)	3.6 (28.1)	2.6 (24.8)	4.4 (36.1)
OVC SE	1.2 (35.3)	1.6 (27.6)	1.3 (25.5)	1.8 (34.6)
OVC S	1.1 (31.4)	1.5 (26.3)	2.4 (35.3)	2.1 (40.4)
OVC SW	2.3 (29.5)	2.8 (23.1)	4.3 (33.6)	2.8 (31.5)
OVC W	4.5 (50.6)	6.7 (38.7)	7.2 (40.7)	9.0 (59.6)
OVC NW	4.0 (58.8)	6.0 (40.8)	5.6 (35.9)	7.4 (60.2)
OVC CALM	15.4 (28.2)	4.7 (21.6)	4.8 (25.0)	11.5 (35.1)
BKN TOTAL	25.2	33.6	43.9	27.9
BKN N	0.7 (30.4)	2.0 (41.7)	3.6 (49.3)	1.1 (34.4)
BKN NE	1.1 (26.8)	1.9 (37.3)	2.3 (44.2)	1.6 (33.3)
BKN E	2.3 (26.7)	4.6 (35.9)	4.9 (46.7)	4.1 (33.6)
BKN SE	1.0 (29.4)	2.2 (37.9)	2.3 (45.1)	1.6 (30.8)
BKN S	1.1 (31.4)	2.0 (35.1)	3.1 (45.6)	1.3 (25.0)
BKN SW	2.1 (26.9)	3.4 (28.1)	5.5 (43.0)	2.7 (30.3)
BKN W	2.3 (25.8)	5.9 (34.1)	7.4 (41.8)	3.6 (23.8)
BKN NW	1.6 (23.5)	5.1 (34.7)	7.3 (46.8)	3.2 (26.0)
BKN CALM	13.1 (23.9)	6.5 (29.8)	7.6 (39.6)	8.7 (26.5)
SCT TOTAL	39.6	36.6	25.2	30.1
SCT N	0.6 (26.1)	1.4 (29.2)	2.2 (30.1)	0.9 (28.1)
SCT NE	1.3 (31.7)	1.8 (35.3)	1.7 (32.7)	1.4 (29.2)
SCT E	2.2 (25.6)	4.6 (35.9)	3.0 (28.6)	3.7 (30.3)
SCT SE	1.2 (35.3)	2.0 (34.5)	1.5 (29.4)	1.8 (34.6)
SCT S	1.3 (37.1)	2.2 (38.6)	1.3 (19.1)	1.8 (34.6)
SCT SW	3.4 (43.6)	5.9 (48.8)	3.0 (23.4)	3.4 (38.2)
SCT W	2.1 (23.6)	4.7 (27.2)	3.1 (17.5)	2.5 (16.6)
SCT NW	1.2 (17.6)	3.6 (24.5)	2.7 (17.3)	1.7 (13.8)
SCT CALM	26.2 (47.9)	10.6 (48.6)	6.8 (35.4)	12.6 (38.4)

TABLE 10.25

Frequency of Cloud Amounts by Class and Wind Direction

STATION: Teslin A (1953 – 1981)

CONDITION	% WINTER	% SPRING	% SUMMER	% AUTUMN
OVC TOTAL	37.5	28.9	24.2	40.0
OVC N	1.4 (24.6)	1.2 (28.6)	1.2 (21.1)	3.6 (31.9)
OVC NE	9.1 (35.7)	3.6 (39.1)	1.8 (31.0)	12.4 (46.4)
OVC E	7.9 (54.1)	4.7 (48.0)	1.8 (36.0)	8.5 (54.1)
OVC SE	1.5 (37.5)	4.0 (37.7)	3.3 (31.4)	3.5 (40.2)
OVC S	0.9 (28.1)	3.8 (24.5)	4.5 (21.8)	2.2 (25.3)
OVC SW	1.4 (38.9)	2.8 (22.0)	3.9 (20.2)	1.3 (21.7)
OVC W	5.2 (47.7)	3.3 (27.0)	3.4 (23.4)	3.1 (38.8)
OVC NW	0.8 (33.3)	0.5 (19.2)	0.6 (20.7)	0.7 (30.4)
OVC CALM	8.7 (27.5)	5.1 (25.0)	3.6 (23.1)	4.7 (37.6)
BKN TOTAL	24.5	34.0	43.1	31.5
BKN N	1.6 (28.1)	1.3 (31.0)	2.1 (36.8)	3.1 (27.4)
BKN NE	5.3 (20.8)	2.6 (28.3)	2.3 (39.7)	6.9 (25.8)
BKN E	3.7 (25.3)	3.0 (30.6)	2.1 (42.0)	4.7 (29.9)
BKN SE	1.4 (35.0)	4.2 (39.6)	4.8 (45.7)	3.4 (39.1)
BKN S	1.1 (34.4)	6.5 (41.9)	8.9 (43.2)	3.8 (43.7)
BKN SW	0.6 (16.7)	5.2 (40.9)	9.2 (47.7)	2.5 (41.7)
BKN W	2.6 (23.9)	4.3 (35.2)	6.7 (46.2)	2.5 (31.3)
BKN NW	0.5 (20.8)	0.8 (30.8)	1.2 (41.4)	0.6 (26.1)
BKN CALM	6.8 (21.5)	4.3 (21.1)	5.9 (37.8)	3.9 (31.2)
SCT TOTAL	38.0	37.1	32.7	28.5
SCT N	2.7 (47.4)	1.7 (40.5)	2.4 (42.1)	4.6 (40.7)
SCT NE	11.1 (43.5)	3.0 (32.6)	1.7 (29.3)	7.4 (27.7)
SCT E	3.0 (20.5)	2.1 (21.4)	1.1 (22.0)	2.5 (15.9)
SCT SE	1.1 (27.5)	2.4 (22.6)	2.4 (22.9)	1.8 (20.7)
SCT S	1.2 (37.5)	5.2 (33.5)	7.2 (35.0)	2.7 (31.0)
SCT SW	1.6 (44.4)	4.7 (37.0)	6.2 (32.1)	2.2 (36.7)
SCT W	3.1 (28.4)	4.6 (37.7)	4.4 (30.3)	2.4 (30.0)
SCT NW	1.1 (45.8)	1.3 (50.0)	1.1 (37.9)	1.0 (43.5)
SCT CALM	16.1 (50.9)	11.0 (53.9)	6.1 (39.1)	3.9 (31.2)

TABLE 10.26

Frequency of Cloud Amounts by Class and Wind Direction

STATION: Watson Lake A (1953 – 1981)

CONDITION	% WINTER	% SPRING	% SUMMER	% AUTUMN
OVC TOTAL	40.9	30.2	23.1	41.0
OVC N	0.4 (31.6)	0.5 (24.3)	1.1 (26.8)	1.5 (40.5)
OVC NE	0.6 (21.4)	1.2 (25.0)	1.5 (22.1)	2.5 (37.9)
OVC E	4.4 (60.3)	8.7 (40.5)	3.7 (28.2)	8.5 (54.8)
OVC SE	4.9 (62.0)	4.9 (40.8)	2.7 (26.2)	6.4 (50.4)
OVC S	1.4 (50.0)	2.0 (36.4)	2.0 (28.6)	2.8 (41.2)
OVC SW	0.9 (32.1)	2.1 (24.7)	2.7 (22.3)	1.5 (25.4)
OVC W	10.2 (48.8)	4.6 (26.1)	4.8 (20.9)	6.0 (36.4)
OVC NW	2.8 (44.4)	1.3 (21.7)	2.4 (25.3)	4.6 (44.2)
OVC CALM	15.4 (33.0)	5.0 (21.6)	2.2 (16.1)	7.3 (33.2)
BKN TOTAL	27.3	38.7	50.2	34.2
BKN N	0.3 (23.2)	0.8 (41.4)	2.2 (53.7)	1.1 (29.7)
BKN NE	0.8 (28.6)	1.8 (37.5)	3.1 (45.6)	2.0 (30.3)
BKN E	2.3 (31.5)	7.6 (35.3)	5.9 (45.0)	4.5 (29.0)
BKN SE	2.0 (25.3)	4.4 (36.7)	4.9 (47.6)	4.5 (35.4)
BKN S	0.8 (28.6)	2.5 (45.5)	3.7 (52.9)	2.8 (41.2)
BKN SW	1.1 (39.3)	4.3 (50.6)	7.0 (57.9)	2.9 (49.2)
BKN W	5.9 (28.2)	7.8 (44.3)	12.5 (54.3)	6.0 (36.4)
BKN NW	1.7 (27.0)	3.0 (50.0)	4.8 (50.5)	3.3 (31.7)
BKN CALM	12.3 (26.4)	7.4 (32.0)	6.0 (43.8)	7.1 (32.3)
SCT TOTAL	31.7	31.1	26.8	24.7
SCT N	0.6 (45.1)	0.7 (34.3)	0.8 (19.5)	1.1 (29.7)
SCT NE	1.4 (50.0)	1.8 (37.5)	2.2 (32.4)	2.1 (31.8)
SCT E	0.6 (8.2)	5.2 (24.2)	3.5 (26.7)	2.5 (16.1)
SCT SE	1.0 (12.7)	2.7 (22.5)	2.7 (26.2)	1.8 (14.2)
SCT S	0.6 (21.4)	1.0 (18.2)	1.3 (18.6)	1.2 (17.6)
SCT SW	0.8 (28.6)	2.1 (24.7)	2.4 (19.8)	1.5 (25.4)
SCT W	4.8 (23.0)	5.2 (29.5)	5.7 (24.8)	4.5 (27.3)
SCT NW	1.8 (28.6)	1.7 (28.3)	2.3 (24.2)	2.5 (24.0)
SCT CALM	18.9 (40.6)	10.7 (46.3)	5.5 (40.1)	7.6 (34.5)

TABLE 10.27

Frequency of Cloud Amounts by Class and Wind Direction

STATION: Whitehorse A (1953 – 1981)

CONDITION	% WINTER	% SPRING	% SUMMER	% AUTUMN
OVC TOTAL	32.9	22.0	17.2	33.3
OVC N	3.8 (47.5)	1.9 (28.4)	1.6 (20.8)	2.7 (50.9)
OVC NE	0.1 (33.3)	0.2 (20.0)	0.3 (20.0)	0.1 (22.5)
OVC E	0.4 (28.6)	0.7 (20.0)	0.8 (16.0)	0.5 (24.7)
OVC SE	7.8 (28.4)	9.0 (23.7)	7.7 (18.6)	11.8 (29.1)
OVC S	5.1 (27.0)	3.2 (17.4)	1.8 (12.3)	5.2 (25.0)
OVC SW	0.3 (23.1)	0.6 (9.7)	0.6 (9.5)	0.5 (18.1)
OVC W	1.0 (25.6)	0.7 (14.6)	0.7 (14.9)	0.5 (15.2)
OVC NW	10.5 (45.3)	3.9 (34.2)	2.0 (24.1)	7.2 (56.3)
OVC CALM	4.0 (25.8)	1.8 (18.0)	1.8 (17.3)	3.8 (34.9)
BKN TOTAL	33.7	43.8	54.7	40.5
BKN N	2.2 (27.5)	2.8 (41.8)	4.2 (54.5)	1.8 (34.0)
BKN NE	0.1 (33.3)	0.5 (50.0)	0.9 (60.0)	0.2 (51.2)
BKN E	0.5 (35.7)	1.9 (51.4)	2.9 (58.0)	0.9 (47.8)
BKN SE	11.3 (41.1)	18.1 (47.8)	23.4 (56.4)	18.9 (46.6)
BKN S	7.2 (38.1)	8.0 (43.5)	7.9 (54.1)	8.8 (42.3)
BKN SW	0.4 (30.8)	2.6 (41.1)	3.4 (54.0)	1.1 (35.9)
BKN W	1.0 (25.6)	1.9 (39.6)	2.4 (51.5)	1.3 (39.4)
BKN NW	6.4 (27.6)	4.4 (38.6)	4.4 (53.0)	3.8 (29.7)
BKN CALM	4.6 (29.7)	3.7 (37.0)	5.2 (50.0)	3.7 (33.9)
SCT TOTAL	33.3	34.1	28.0	26.2
SCT N	2.0 (25.0)	2.0 (29.9)	1.9 (24.7)	0.8 (15.1)
SCT NE	0.1 (33.3)	0.3 (30.0)	0.3 (20.0)	0.1 (26.3)
SCT E	0.5 (35.7)	1.0 (28.6)	1.3 (26.0)	0.5 (27.5)
SCT SE	8.4 (30.5)	10.8 (28.5)	10.4 (25.1)	9.9 (24.4)
SCT S	6.6 (34.9)	7.2 (39.1)	4.9 (33.6)	6.8 (32.7)
SCT SW	0.6 (46.2)	3.0 (48.4)	2.3 (36.5)	1.4 (46.0)
SCT W	1.9 (48.7)	2.2 (45.8)	1.6 (34.0)	1.5 (45.5)
SCT NW	6.3 (27.2)	3.1 (27.2)	1.9 (22.9)	1.8 (14.1)
SCT CALM	6.9 (44.5)	4.5 (45.0)	3.4 (32.7)	3.4 (31.2)

TABLE 10.28

Number of Occurrences of Fog (Visibility <10 km) at Each Hour by Month

STATION: Aishihik (1953 – 1966)

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	28	32	33	34	34	41	40	42	39	42	38	34	29	19	17	16	22	20	18	21	20	22	21	25	688
FEB.	6	5	7	9	9	8	10	11	17	15	11	9	7	3	2	4	3	3	4	4	5	5	5	6	168
MAR.		1	3	2	3	4	5	14	11	5	5	4	3	2		2	1			1	1		1	1	69
APR.	1	1	1	1	3	3	4	4	5	4	2	2	1						1	1	2	2	1	1	40
MAY	1	6	4	3	6	4	3	5	5	1	2								1		1		2	1	45
JUN.	4	5	6	4	11	12	10	8	4	3	1	1	2	2			1					1	1	3	79
JUL.	2	3	3	5	8	8	7	7	5	3	2	2	4	1	1	1	1				1	1	1		66
AUG.		1	5	8	15	17	15	16	10	6		1			1	1									96
SEP.	1	3	4	4	9	18	19	20	15	13	4	2	1			1	1	1	1	1	1	2	2	1	124
OCT.	4	8	13	15	15	15	23	22	20	17	15	9	4	8	4	3	3	4	3	3	4	5	5	4	226
NOV.	36	36	36	34	40	41	38	45	48	42	41	37	33	20	13	16	19	22	24	22	21	24	32	34	754
DEC.	27	26	24	32	34	31	31	34	32	32	35	31	29	28	26	32	32	29	30	27	27	27	30	28	714
ANN.	110	127	139	151	187	202	205	229	211	183	156	132	112	83	64	76	80	79	82	80	83	89	101	104	3069

TABLE 10.29

Number of Occurrences of Fog (Visibility <10 km) at Each Hour by Month

STATION: Beaver Creek (1968 – 1977)

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	4	12		4	14		39	16		44	14		47	10		32	4		45	12		4	14		
FEB.	2	4		1	7		11	8		14	5		4			1			2	2		1	5		
MAR.							3	3		6			1						1						
APR.		1					1	1		2			1										1		
MAY	1			1			1	2		1	1		1	1					2						
JUN.					1		2	1																	
JUL.	1			1	1		5	1		2			2			2			4			1			
AUG.		1		1			4			2															
SEP.	1	1		1	1		4	3		6	4		1	1			1			1			2		
OCT.	1	4			7		3	7		8	10		5	5		1	1		5	1			3		
NOV.				1	3		3	1		5	5		3	2		1	1		4	2					
DEC.	3	13		3	13		11	15		19	14		17	12		14	12		16	17		5	18		
ANN.	13	36		13	47		87	58		109	53		82	31		51	19		79	35		11	43		

TABLE 10.30

Number of Occurrences of Fog (Visibility <10 km) at Each Hour by Month

STATION: Burwash A (1966 – 1981)

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	15	19	19	18	21	17	17	17	14	17	22	25	25	27	25	25	25	21	20	19	14	16	17	15	473
FEB.	4	5	5	7	6	7	6	6	8	12	9	10	4	5	4	2	3	5	5	6	4	6	5	3	137
MAR.						1	1	1	2	1	2								1	1	1	1	1	1	14
APR.			1	2	2	6	4	3	3																21
MAY		1	2	4	6	9	8	8	6	3	1	1		1			1			1		1	1	2	56
JUN.	2	1		3	3	2	3	5	3	4	3	2	2	1	1	1	1	1	1	1	2	2	1	1	46
JUL.	2	1	3	8	10	12	8	10	7	2	3	4	5	3	2	1		1	1	3	4	2	2	1	95
AUG.	4	1	2	1	5	3	4	2	3	3	4	4	5	2	5	6	5	2	1	2	2	4	5	4	79
SEP.	2	2	2	3	4	6	4	5	3	5	2	1	4	6	5	2	3	4	4	4	3	2	2	3	81
OCT.	6	6	6	4	7	7	8	7	8	8	10	9	5	2	2	2	2	1	2	2	2	4	2	3	115
NOV.	14	15	20	19	16	16	12	16	14	17	18	19	17	17	17	14	13	14	11	14	11	11	13	15	363
DEC.	17	14	15	13	13	13	14	13	17	15	15	20	17	14	12	12	12	13	11	14	14	11	13	17	339
ANN.	66	65	75	82	93	99	89	93	88	87	89	95	84	78	76	65	65	62	57	67	56	60	62	65	1819

TABLE 10.31

Number of Occurrences of Fog (Visibility <10 km) at Each Hour by Month

STATION: Dawson (1953 – 1976)

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	165	136	139	168	137	142	169	178	175	151	150	149	129	90	89	113	96	101	117	129	136	162	138	137	3296
FEB.	49	50	47	56	51	54	63	61	66	65	60	50	43	18	13	10	8	12	15	20	30	39	37	35	952
MAR.	2	3	1	4	7	6	4	7	11	13	11	3											1	1	74
APR.	2	4	3	3	2	5	8	7	2	1	2									1			2	2	46
MAY	2	1	5	8	13	16	15	12	4									1	1					1	79
JUN.		2	3	6	11	14	18	13	2						1	1									71
JUL.	1	1	7	15	14	19	24	15	8	2	1	2	3	2	1	1		1						1	118
AUG.	1	3	9	27	39	63	93	89	69	31	8	4	2	3	1	1	2	2	3	2	2	2	1	1	458
SEP.	9	6	14	39	37	55	99	107	94	68	26	6	2	1	2	1	1	1	2	2	5	2	1	2	582
OCT.	15	14	13	23	21	22	30	45	43	35	29	15	10	4	2	4	2	3	4	9	8	11	9	11	382
NOV.	30	27	27	38	26	27	37	36	43	49	38	39	37	24	19	30	20	20	25	26	29	39	27	26	749
DEC.	106	83	81	105	88	87	111	109	107	114	117	111	108	80	76	107	78	88	85	86	88	113	91	85	2304
ANN.	382	330	349	492	446	510	671	679	624	529	441	379	334	222	204	268	207	229	252	275	298	368	307	302	9098

TABLE 10.32

Number of Occurrences of Fog (Visibility <10 km) at Each Hour by Month

STATION: Dawson A (1976 – 1981)

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	10	8	8	8	9	10	8	11	11	12	15	12	12	13	12	10	10	13	13	15	16	11	12	10	269
FEB.	6	5	4	4	2	3	4	5	7	10	12	7	5	5	3	2		1	1	1	1	1	1	4	94
MAR.					1	1	2	6	8	2	3	1						1							24
APR.			1	1	1		2	2	1				1												9
MAY			2	2	2	8	11	10	6	1	1	1	1	1											46
JUN.		1	3	5	8	10	11	10	6	2		1	1	2	2	2	2				1	1	1		69
JUL.	4	6	8	12	12	18	21	20	13	4	3	1	1	1			1	1	2	1	2	2	3	3	139
AUG.	1	2	2	5	7	15	24	26	21	16	7	3	4	2	1		1							1	138
SEP.	3	3	5	9	13	19	31	38	37	35	30	19	7	3	2	2	1	1	1	1	1	1	1	2	265
OCT.	12	11	12	14	15	16	17	16	17	19	22	21	16	10	5	6	5	7	11	12	12	11	15	13	315
NOV.	3	4	5	5	4	4	4	4	7	10	13	13	10	11	6	6	6	5	5	5	2	3	3	3	141
DEC.	14	12	11	10	12	12	12	12	14	14	18	18	19	14	17	16	17	15	15	18	15	15	16	14	350
ANN.	53	52	61	75	86	116	147	160	148	125	124	97	77	62	48	44	43	44	48	48	50	45	52	50	1855

TABLE 10.33

Number of Occurrences of Fog (Visibility <10 km) at Each Hour by Month

STATION: Faro (1972 – 1977)

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.					6			9			6			3			6			5			1		
FEB.					4			5			2									1					
MAR.					2			5			1			1											
APR.					2			2									1			1					
MAY					3			2												1					
JUN.					3			1																	
JUL.					3			6																	
AUG.					2			7																	
SEP.					2			5			5						1								
OCT.					4			6			9			2						1			1		
NOV.											1			2			1								
DEC.					7			6			4			4			1			3					
ANN.					38			54			28			12			10			12			2		

TABLE 10.34

Number of Occurrences of Fog (Visibility <10 km) at Each Hour by Month

STATION: Haines Junction (1960 – 1979)

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.								7		9	6		5	7		4	8								
FEB.								4		9	6		2	2		1									
MAR.											1						1								
APR.																									
MAY							1	1		2	1		2			1									
JUN.							1	3		1	4			1											
JUL.							4	5		2	4			1			1								
AUG.							6	5		2	3		1	1			2								
SEP.							6	10		4	4						1								
OCT.							5	8		7	6		1	3			1								
NOV.							5	5		6	5		3	2		3									
DEC.								8		22	5		8	7		12	6								
ANN.								56		64	43		22	24		21	20								

TABLE 10.35

Number of Occurrences of Fog (Visibility <10 km) at Each Hour by Month

STATION: Komakuk Beach A (1973 – 1981)

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	18			8			14			5			14			12			35			10			
FEB.	7						5			2			24			6			24			2			
MAR.	12			2			6			7			34			2			19			7			
APR.	15			6			31			10			38			6			20			6			
MAY	43			4			76			6			53			4			25			5			
JUN.	28			2			60			6			38			1			22			2			
JUL.	27			7			70			7			52			1			21			1			
AUG.	61			10			92			13			72			2			43			9			
SEP.	57			12			66			8			72			6			46			5			
OCT.	20						31			1			56			1			39						
NOV.	15			3			11			2			24			2			42						
DEC.	4			1			5			1			5			3			22			3			
ANN.	307			55			467			68			482			46			358			45			

TABLE 10.36

Number of Occurrences of Fog (Visibility <10 km) at Each Hour by Month

STATION: Mayo A (1953 – 1981)

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	108	8	7	122	16	14	111	130	126	104	122	121	95	58	50	68	54	76	84	76	75	116	63	61	1865
FEB.	24	3	3	38	8	10	32	42	44	47	40	22	12	7	1	5	1	2	5	6	8	23	14	16	413
MAR.		1	2	6	2	2	2	7	9	6	1	1	1			1									41
APR.	1		1	2	1	1	6	5	4	3	2								1	1					28
MAY	2	1	1	3	5	5	7	8	3	2	1		1	2	2	1	1	1	1	1	1	1	2	3	55
JUN.	3	2	4	5	4	4	11	12	7	2	4	2	3	3	1	1	1	1			1	1	1	1	74
JUL.	4	2	5	11	8	10	13	15	9	3	2	3	2	1									1	1	90
AUG.	5	2	4	12	10	11	49	41	33	18	7	5	1	1			1		1	1	1	1	2	2	208
SEP.	3	3	4	13	12	18	50	54	46	33	20	15	6	2	1	1	3	2	2	1	1	1		1	292
OCT.	6	4	4	17	8	7	20	31	36	28	17	15	9	6	2	4	5	5	4	4	7	8	6	8	261
NOV.	37	8	9	46	18	20	58	57	60	64	64	53	39	17	12	23	15	22	24	17	19	36	22	23	763
DEC.	90	26	26	100	39	39	104	111	107	121	121	114	100	72	70	100	72	84	83	66	56	99	65	71	1936
ANN.	283	60	70	375	132	142	463	513	484	431	399	351	269	176	138	204	153	193	205	173	169	286	176	187	6032

TABLE 10.37

Number of Occurrences of Fog (Visibility <10 km) at Each Hour by Month

STATION: Shingle Point A (1973 – 1981)

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	17			1			6						11			13			34			4			
FEB.	10			1			4			1			21			11			26			4			
MAR.	6			1			3			4			17			5			12			7			
APR.	20			2			17			8			38			6			21			4			
MAY	29			3			69			12			59			6			29			3			
JUN.	33			2			63			3			42			4			25			2			
JUL.	19			6			40			3			22			3			8			2			
AUG.	38			2			52			2			43			1			20			2			
SEP.	42			7			49			10			60			6			30			6			
OCT.	23			1			13			1			57			5			34			3			
NOV.	11			2			12			2			24			4			30			2			
DEC.	4			1			7						7			8			15			2			
ANN.	262			29			335			46			402			72			284			41			

TABLE 10.38

Number of Occurrences of Fog (Visibility <10 km) at Each Hour by Month

STATION: Snag A (1953 – 1966)

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	22	20	24	25	24	30	31	31	24	26	29	26	23	17	16	15	18	20	20	20	19	18	18	22	538
FEB.	8	11	10	12	13	18	19	16	16	17	14	6	7	4	4	4	4	3	3	3	1	3	5	7	208
MAR.	3	4	4	5	8	8	6	6	6	6	6	5	4	4	2	1	1	2	3	2	1		1	2	90
APR.	3	2	3	2	1	3	4	1	1									1	2	2	2	2	1	2	32
MAY	2	4	5	4	7	7	8	9	9	6	6	3	2	2	3	1			1		1	2	3	2	87
JUN.	3	3	6	6	10	13	11	7	4	2	2	3	1	1	1	1	1	2	3	3	2	2	4	2	93
JUL.	7	8	9	10	16	18	20	15	14	9	8	7	6	6	5	4	2	2	1	1	1	2	3	5	179
AUG.	7	6	5	10	15	25	29	25	15	10	5	5	4	1	2	1	1	2	1	2	2	1	2	3	179
SEP.	12	18	20	21	25	32	46	49	42	38	20	9	6	3	3	4	2	4	6	4		1	4	9	378
OCT.	26	35	39	39	47	55	59	64	65	52	37	24	17	10	9	8	9	11	10	9	8	10	17	22	682
NOV.	34	36	38	40	37	39	42	36	39	39	38	28	22	17	15	14	11	16	23	26	29	31	33	32	715
DEC.	24	23	19	16	17	24	27	28	31	33	26	29	25	27	30	24	24	23	25	28	31	28	27	22	611
ANN.	151	172	182	191	220	272	302	287	266	238	191	145	117	93	90	77	73	86	98	100	97	100	118	130	3796

TABLE 10.39

Number of Occurrences of Fog (Visibility <10 km) at Each Hour by Month

STATION: Teslin A (1953 – 1981)

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	17	19	18	19	19	20	21	20	23	21	24	22	19	14	11	14	15	10	9	13	15	11	14	17	405
FEB.	5	4	8	9	10	11	10	7	5	14	16	7	6	5	3	3	3	4	4	4	4	6	6	6	159
MAR.	4	5	6	6	6	6	5	5	8	5	1			1				1		1	3	2	2	3	70
APR.	1	2	1	2	3	1	3	2	1	1															17
MAY	5	5	10	11	10	12	11	7	5	3	2	5	2	2	2	1						1	1	3	98
JUN.		4	5	7	11	10	10	6	4	1							1	1		1	1	2	1		65
JUL.	2		1		3	7	9	8	7	4	3	4	1	1	1	1		1	1	1			2	1	58
AUG.			4	9	12	15	20	18	17	15	8	5	2							1					126
SEP.	3	4	6	7	13	16	28	31	29	19	9	2	2	2	4	2	5	2	3	1	1	1	4	1	193
OCT.	7	5	8	13	12	18	16	18	20	23	12	6	5	6	3	5	4	5	6	6	6	4	7	3	218
NOV.	14	16	22	23	24	24	19	20	24	29	30	26	29	23	13	9	5	6	5	8	14	9	14	15	421
DEC.	21	32	31	30	32	30	27	27	26	30	40	37	32	20	21	16	17	16	23	27	27	25	31	32	650
ANN.	89	96	120	136	155	169	182	169	169	165	145	114	98	74	58	51	50	46	51	63	71	62	82	84	2499

TABLE 10.40

Number of Occurrences of Fog (Visibility <10 km) at Each Hour by Month

STATION: Watson Lake A (1953 – 1981)

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	80	80	85	85	99	102	107	100	93	94	85	79	60	45	28	19	23	36	44	50	64	72	79	83	1692
FEB.	44	45	47	53	55	57	55	51	63	67	56	32	14	7	4	6	7	15	20	20	31	26	26	35	836
MAR.	8	9	12	20	19	25	23	24	21	16	3	3					1	1	3	6	5	7	9	6	221
APR.	11	10	16	16	17	19	16	10	11	1	1	1	2	1	2	2	1	1	3	3	4	4	7	10	169
MAY	6	7	8	12	20	22	23	14	8	7	3	5	7	3	3	1	1	2	2	2	2	4	8	5	175
JUN.	7	8	14	16	24	25	21	12	6	4	3	2	3	5	5	3	2	3	3	2	1	2	3	6	180
JUL.	9	11	15	22	32	37	29	24	13	9	5	5	3	4	1	1	3	2	1	1		3	3	4	237
AUG.	15	16	29	41	66	68	78	56	31	15	9	3	3	4	3	1	2	1	1	3	2	4	6	6	463
SEP.	25	39	58	68	76	102	107	93	72	54	27	16	10	8	6	5	2	8	6	11	12	13	18	22	858
OCT.	69	80	90	103	101	100	86	88	77	65	36	18	10	13	8	7	12	19	25	41	48	61	63	65	1285
NOV.	67	69	81	81	84	83	78	75	73	73	65	53	34	20	18	22	27	29	33	35	37	40	53	62	1292
DEC.	68	65	71	76	75	78	80	83	81	84	71	68	61	44	37	43	46	52	59	66	73	64	70	73	1588
ANN.	409	439	526	593	666	718	703	630	549	489	364	285	207	154	114	110	127	169	200	240	279	300	345	377	8996

TABLE 10.41

Number of Occurrences of Fog (Visibility <10 km) at Each Hour by Month

STATION: Whitehorse A (1953 – 1981)

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	88	82	79	81	88	86	93	96	107	99	104	95	84	73	65	54	66	61	65	69	70	76	79	80	1940
FEB.	10	10	11	13	19	17	16	22	28	29	29	24	16	10	6	5	5	5	3	3	3	5	7	8	304
MAR.	2	1	2	3	3	6	7	6	4	4	2	1						1							42
APR.		2	2	2	1	3	3	6	5	2	2	1		1				1	1	2	3	1	1		39
MAY	2	2	3	3	3	5	4	3				1	1				2				1	2	3	3	38
JUN.	1	3	3	3	4	6	9	6	5	5	2	2	1											1	51
JUL.	2	1	6	5	9	7	3	3	1	4	1		1		2	2	1	2	2	2	1	1	1	3	60
AUG.	4	7	10	7	13	22	17	15	12	9	9	7	4	4	3	2	3	3		2	2	1	2	3	161
SEP.	6	8	14	13	23	24	29	32	22	10	5	2	1	1	1	1	1	2	2	2	3	4	2	2	210
OCT.	16	15	19	20	24	25	20	27	30	21	18	7	4	1	4	3	4	3	4	3	5	5	5	8	291
NOV.	36	35	31	37	39	41	42	41	39	45	41	33	29	18	11	12	11	16	22	23	25	33	34	34	728
DEC.	83	81	75	69	69	68	79	80	81	86	82	78	68	68	57	58	63	63	72	68	75	77	83	83	1766
ANN.	250	247	255	256	295	310	321	337	334	314	295	251	209	176	149	137	156	157	173	174	188	205	217	225	5630

TABLE 10.42

Occurrences of Blowing Snow Observed for Period of Record

STATION: Aishihik A (1953 – 1966)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	1	1					2							1	1		1	1	1	1					10
FEB.	1	1	1	2	1	1	1	1	1	1	3	2	2		1								1	1	21
MAR.	1	1											1	1				1	1	2	1				9
APR.				1	1	1	1	1																	5
MAY																									
JUN.																									
JUL.																									
AUG.																									
SEP.																									
OCT.																									
NOV.					1																				
DEC.	1	1	2				1	1				1	1	1	1	3	3	2	1				2	2	23
ANN.	4	4	3	3	3	2	5	3	1	1	3	3	4	3	3	3	4	4	3	3	1	0	3	3	68

TABLE 10.43

Occurrences of Blowing Snow Observed for Period of Record

STATION: Burwash A (1966 – 1982)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.		1		2	1	2		1	2	2	2	4	4	4	2	1	2	2	2	1					35
FEB.		2	1	2	2	2	2	2		1	1	1	2	1	2	2	1	1	2	1					28
MAR.									1	1	1	1	1												5
APR.	1					1	1	1	1	1		1	1		1									1	10
MAY																									
JUN.																									
JUL.																									
AUG.																									
SEP.	1		1	1									1	1											5
OCT.	1															1									2
NOV.	1	2	3	3	4	2	2	2	1	2	2	3	2		1		1	1	1	4	2	2	2	2	45
DEC.	3	4	2	2	3	3	3	2	1	2	3	3	2	4	4	6	3	5	3	5	6	4	4	4	81
ANN.	7	9	7	10	10	10	8	9	6	9	9	13	13	10	10	10	7	9	8	11	8	6	6	7	211

TABLE 10.44

Occurrences of Blowing Snow Observed for Period of Record

STATION: Dawson (1953 – 1976)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	4	2	2	3	2	3	2	1	1	1		1	2					1	1	2	1	4	2	2	37
FEB.	6	3	2	2	2	3	1	1				1	2		2	2	3	5	6	6	7	5	5	4	68
MAR.		1	1	1							1			1	1	2	2	1	1	1		1			14
APR.	1	2	1	2	2	1	2	3	2	2	3			1	1									1	24
MAY																									
JUN.																									
JUL.																									
AUG.																									
SEP.																					1				1
OCT.			1					2	1					1	1	1	2	2	1	1	3	1			17
NOV.	2		1	2	1	1	1	2	1	1				1	1	1	1	1	1	1	1	1			21
DEC.	8	6	6	7	6	7	8	7	8	6	6	4	3	3	4	5	5	4	5	5	3	6	4	5	131
ANN.	21	14	14	17	13	15	16	16	13	10	10	6	7	7	10	11	13	14	15	16	16	18	11	12	313

TABLE 10.45

Occurrences of Blowing Snow Observed for Period of Record

STATION: Komakuk Beach A (1973 – 1982)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	71			15			68			16			72			15			63			17			
FEB.	48			11			43			10			43			7			54			12			
MAR.	52			8			56			9			47			12			63			8			
APR.	15			5			16			2			28			5			22			3			
MAY	16			4			20			3			27			3			16			1			
JUN.																									
JUL.																									
AUG.																			2						
SEP.	2						3						1						1						
OCT.	28			2			31			2			32			2			24			1			
NOV.	62			5			60			8			54			7			43			5			
DEC.	67			7			70			9			85			6			72			7			
ANN.	361						367						389						360						

TABLE 10.46

Occurrences of Blowing Snow Observed for Period of Record

STATION: Mayo (1953 – 1982)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.											1														1
FEB.				2	4	4	3	3	2	3	3	2	2	2	1	1	1					1	1	1	36
MAR.	1	1						2											1	2	1	1	1	1	11
APR.								1	1						1	1									4
MAY																									
JUN.																									
JUL.																									
AUG.																									
SEP.																									
OCT.	1	1	1	1	2	1	1	1	1				2	2	1	1	1	1	1	1	1	2	2	2	27
NOV.	3	1	1	1	1	1								1					1	1	1	2	1	1	16
DEC.	1									1		2										1			5
ANN.	6	3	2	4	7	6	4	7	4	4	4	4	4	5	3	3	2	1	3	4	3	7	5	5	96

TABLE 10.47

Occurrences of Blowing Snow Observed for Period of Record

STATION: Shingle Point (1973 – 1982)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	45			6			42			3			31			4			31			7			
FEB.	31			5			30			8			30			6			28			6			
MAR.	12			4			19			5			16			3			17			2			
APR.	5			1			6			0			11			3			8			0			
MAY	2			2			3			1			5			1			2			1			
JUN.																									
JUL.																									
AUG.							1																		
SEP.	2						2						3						1						
OCT.	19			1			22			2			23			1			20			1			
NOV.	29			1			37			1			30			2			25			3			
DEC.	54			3			59			5			39			2			44			3			
ANN.	199						221						188						176						

TABLE 10.48

Occurrences of Blowing Snow Observed for Period of Record

STATION: Snag A (1953 – 1966)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	2	2	1	1	1	1	1	1													2	3	1	1	17
FEB.				1				1	1	1	2	3	3	2	2	1	1	1	1	2	1				23
MAR.	1	1	2	1	1		1	3	5	4	4	3	2	3	4	2	2	2	3	2	2	2	2	1	53
APR.	5	4	4	3	3	3	2	2	3	2	1	2	2	1	1	1	1	1	1	1	1	1	2	3	50
MAY						1	1	1																	3
JUN.																									
JUL.																									
AUG.																									
SEP.																									
OCT.																									
NOV.												1	2	2	1	1									7
DEC.		1			1	1	1				1										1	1	1	1	9
ANN.	8	8	7	6	6	6	6	8	9	7	8	9	9	8	8	5	4	4	5	5	7	7	6	6	162

TABLE 10.49

Occurrences of Blowing Snow Observed for Period of Record

STATION: Teslin A (1953 – 1982)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.		2	2	3	3	2	1	1	1	2	2	2	1	1	2	2						1	1		29
FEB.		1	1	1	1	1		1	1	2	1	1	1	2	2	2		1	1		1	1			22
MAR.					1				1	1	2	3	5	4	4	3	2	2	2	2	1	1			34
APR.													1	1	1	1									4
MAY																									
JUN.																									
JUL.																									
AUG.																									
SEP.																									
OCT.																									
NOV.			1	1	1	2	1			1	1		1				1				1	1	1	1	14
DEC.	2	2	2	1			1	2	1			4	4	5	2	2	1	1	1	1	3	2	1	1	39
ANN.	2	5	6	6	6	5	3	4	4	6	6	10	13	13	11	10	4	4	4	3	6	6	3	2	142

TABLE 10.50

Occurrences of Blowing Snow Observed for Period of Record

STATION: Watson Lake A (1953 – 1982)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	2	1	1	1	2	2	1	2	1	2	2	3	1	1	1	1	1	1	2	2	3	2	1	3	39
FEB.	1	1		1	1	1	1	3	2	3	3	4	4	3	2	1	1	1	2	2	2	2	1	1	43
MAR.	3	3	2	2	2	1	2	2	5	4	4	5	5	3	4	4	4	5	4	5	4	3	4	5	85
APR.										1	1	1	1	1	1										6
MAY																									
JUN.																									
JUL.																									
AUG.																									
SEP.																									
OCT.				1	2	2	2								1										8
NOV.			1			1		1	1	1	1	1	1				1	1	1	1					12
DEC.	1	1	1	2	2	2	1				2				1					1	2	2	2	2	22
ANN.	7	6	5	7	9	9	7	8	9	11	13	14	12	8	10	6	7	8	9	11	11	9	8	11	209

TABLE 10.51

Occurrences of Blowing Snow Observed for Period of Record

STATION: Whitehorse (1953 1982)

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOT
JAN.	3	4	2	4	7	4	5	5	4	2	1	1	2	1	1			3	3	2	1	1	4	4	64
FEB.	1			2	2	1	1	1	1	3	2	1	1		2	3	1	1		1	1	1		1	27
MAR.	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	36
APR.												1										1			2
MAY																									
JUN.																									
JUL.																									
AUG.																									
SEP.																									
OCT.																									
NOV.	3	3	4	3	1		1	2		2	3	1	2	1	1	1	2	2	4	3	3	3	4	6	55
DEC.	3	4	3	6	8	6	3	3	3	2	2	1	1	2	2	3	5	5	4	4	6	6	5	4	91
ANN.	11	12	10	16	18	12	12	13	10	11	10	7	8	6	8	9	10	12	13	11	12	13	14	16	275

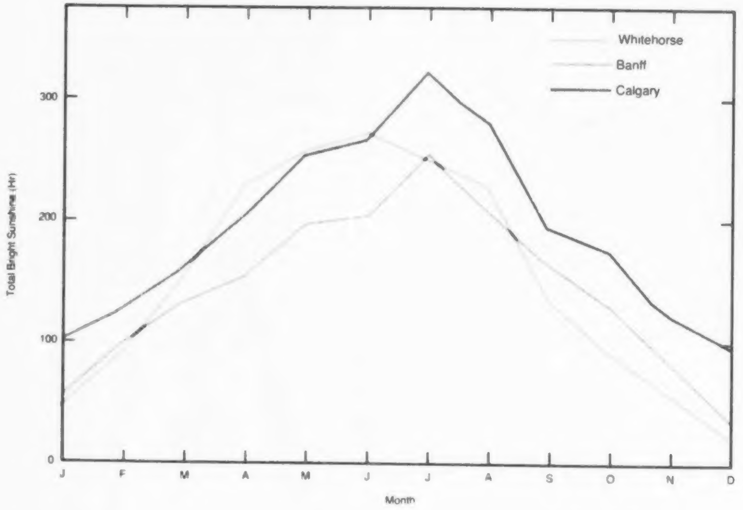


Figure 10.1 Total bright sunshine average each month for Whitehorse, Banff and Calgary

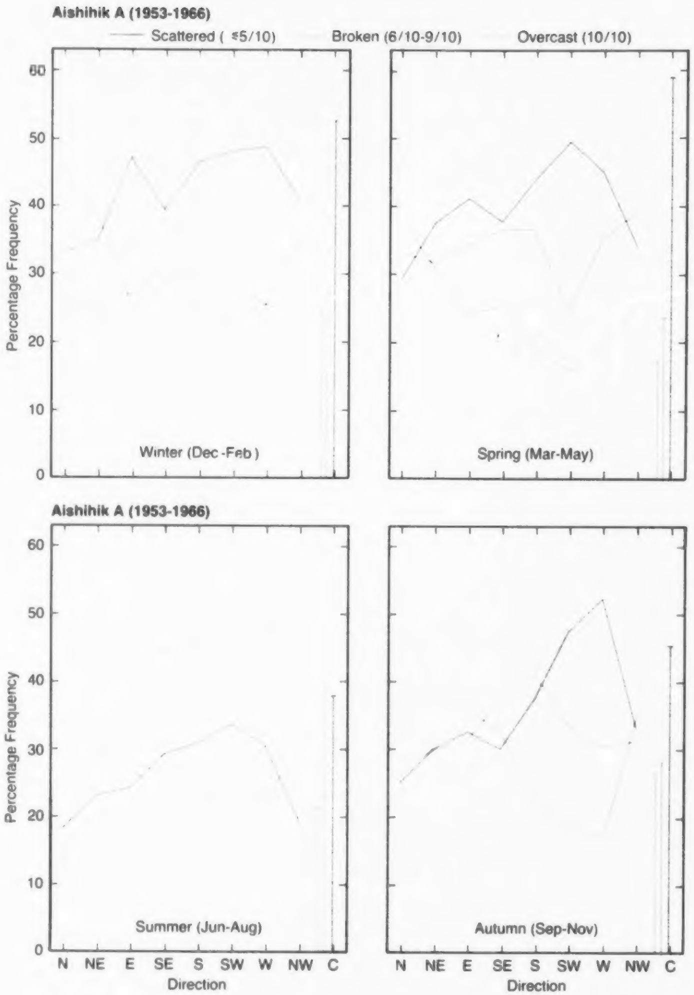


Figure 10.2 Percentage frequency of occurrence of scattered, broken and overcast cloud by wind direction, for each season at Aishihik

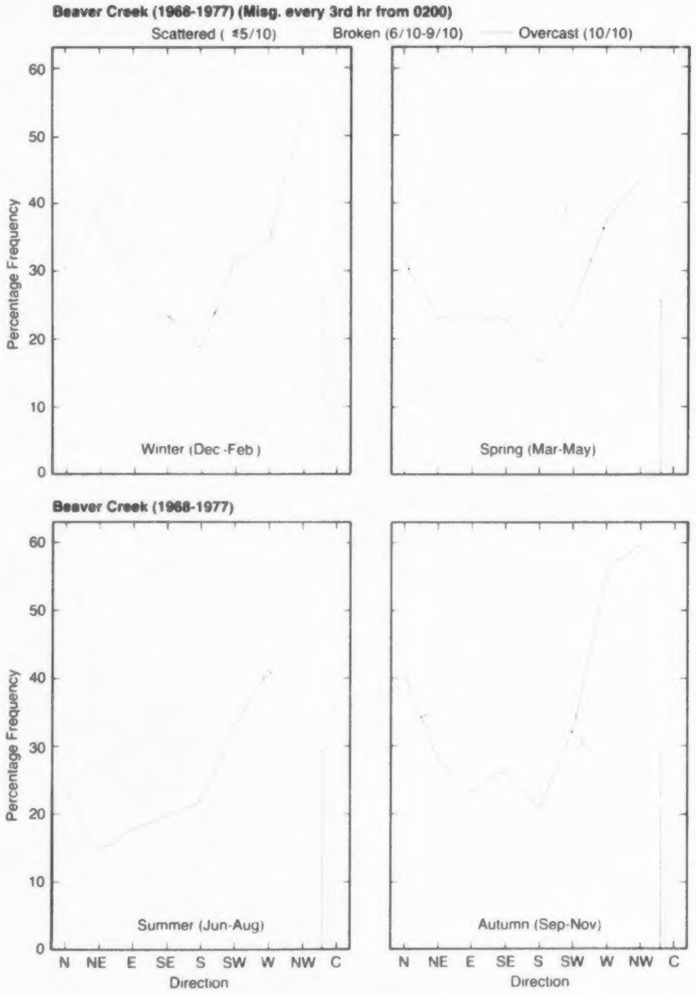


Figure 10.3 Percentage frequency of occurrence of scattered, broken and overcast cloud by wind direction, for each season at Beaver Creek

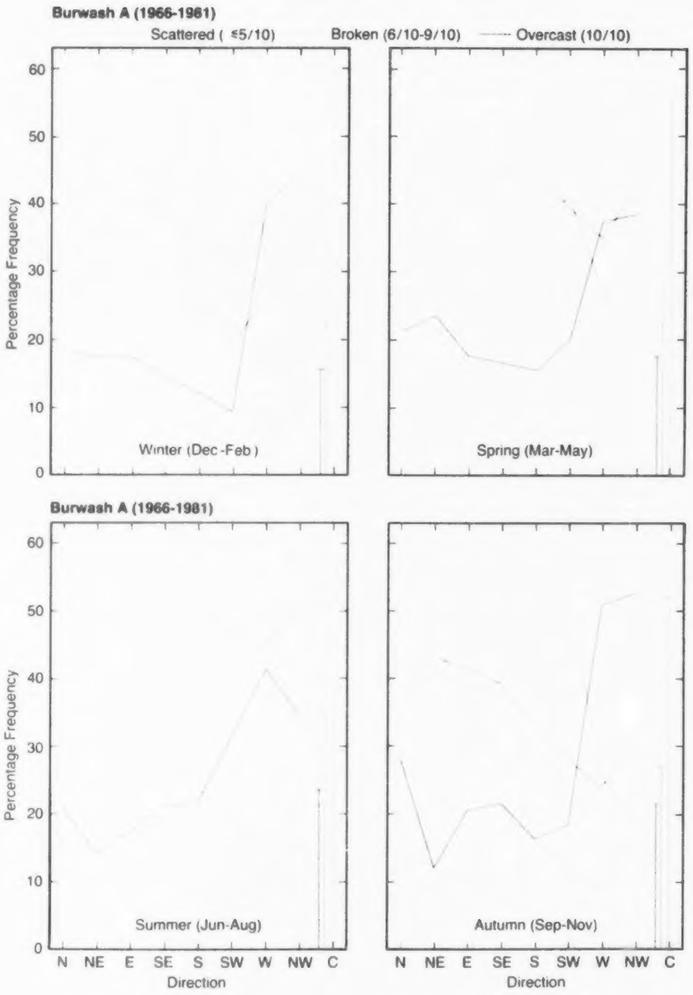


Figure 10.4 Percentage frequency of occurrence of scattered, broken and overcast cloud by wind direction, for each season at Burwash A

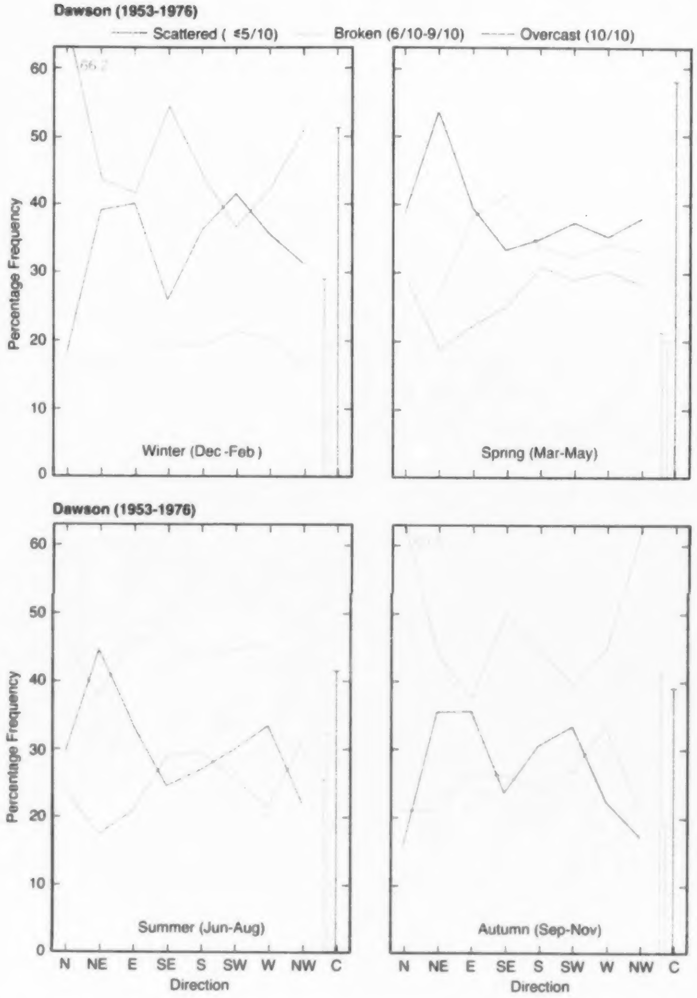


Figure 10.5 Percentage frequency of occurrence of scattered, broken and overcast cloud by wind direction, for each season at Dawson

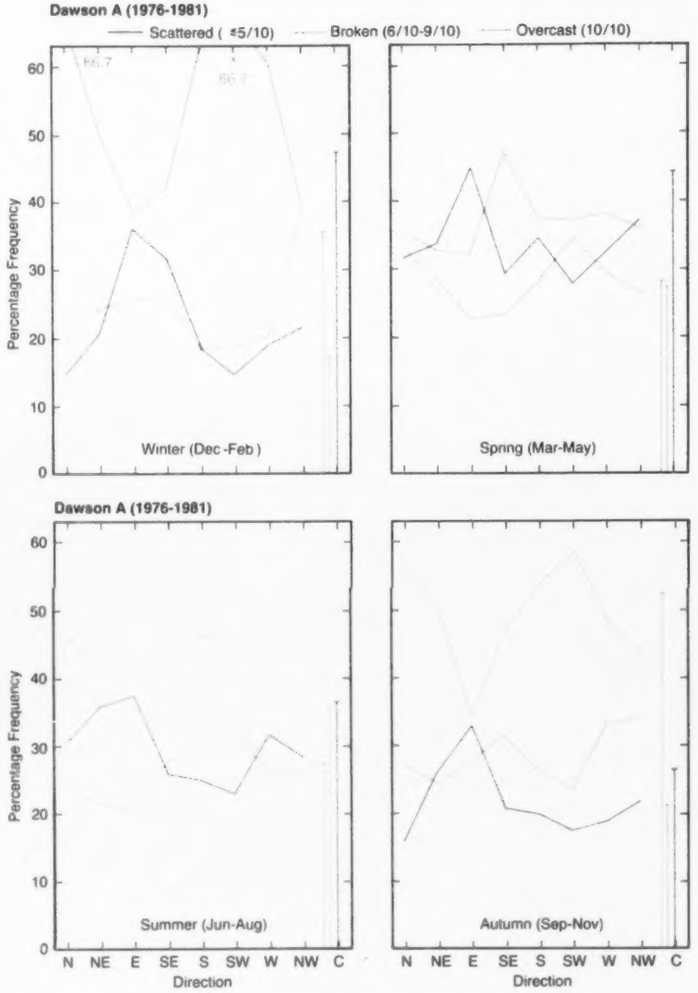


Figure 10.6 Percentage frequency of occurrence of scattered, broken and overcast cloud by wind direction, for each season at Dawson A

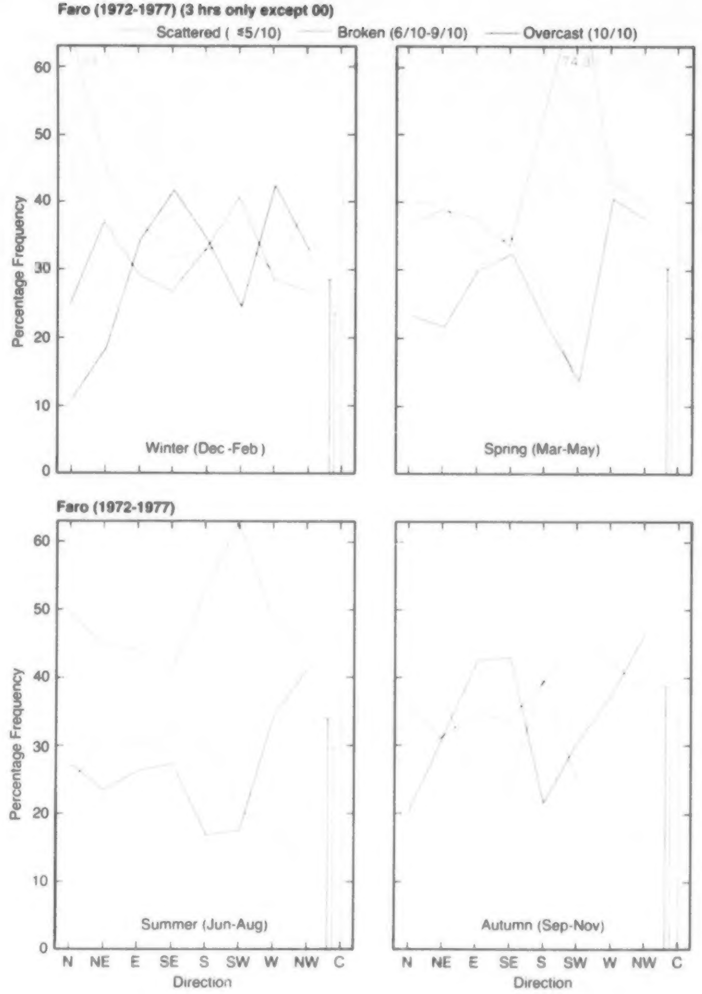


Figure 10.7 Percentage frequency of occurrence of scattered, broken and overcast cloud by wind direction, for each season at Faro

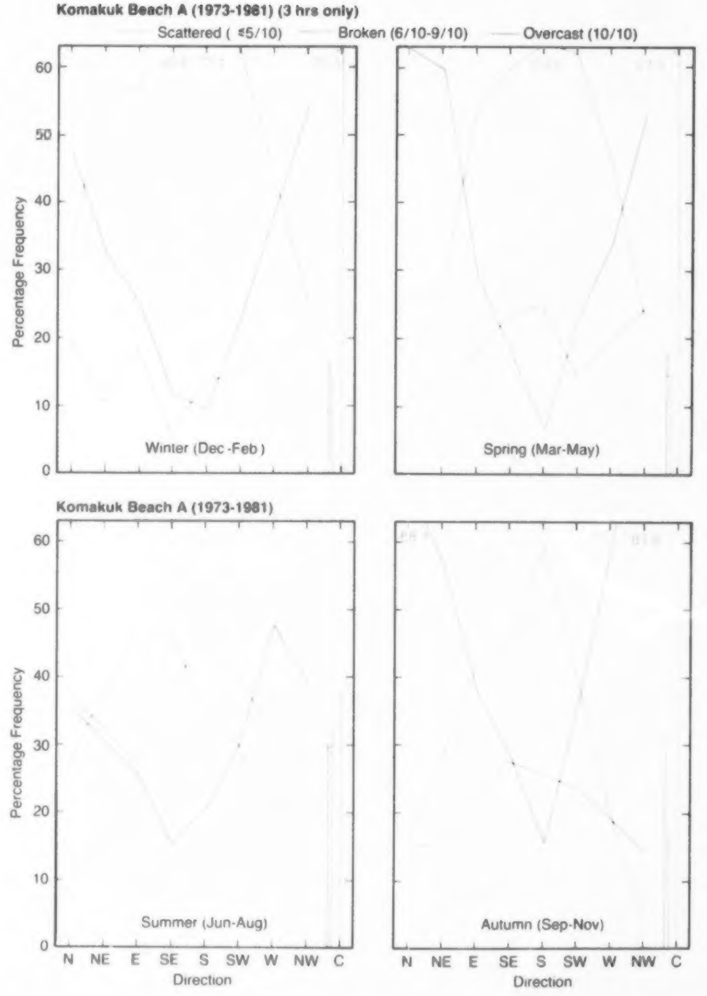


Figure 10.8 Percentage frequency of occurrence of scattered, broken and overcast cloud by wind direction, for each season at Komakuk Beach A

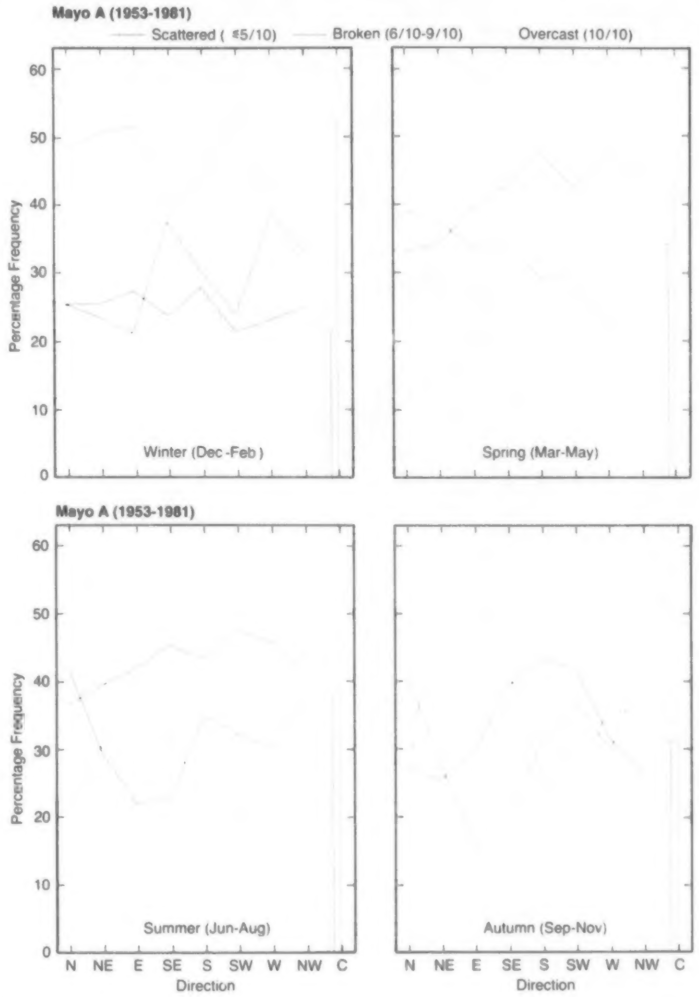


Figure 10.9 Percentage frequency of occurrence of scattered, broken and overcast cloud by wind direction, for each season at Mayo A

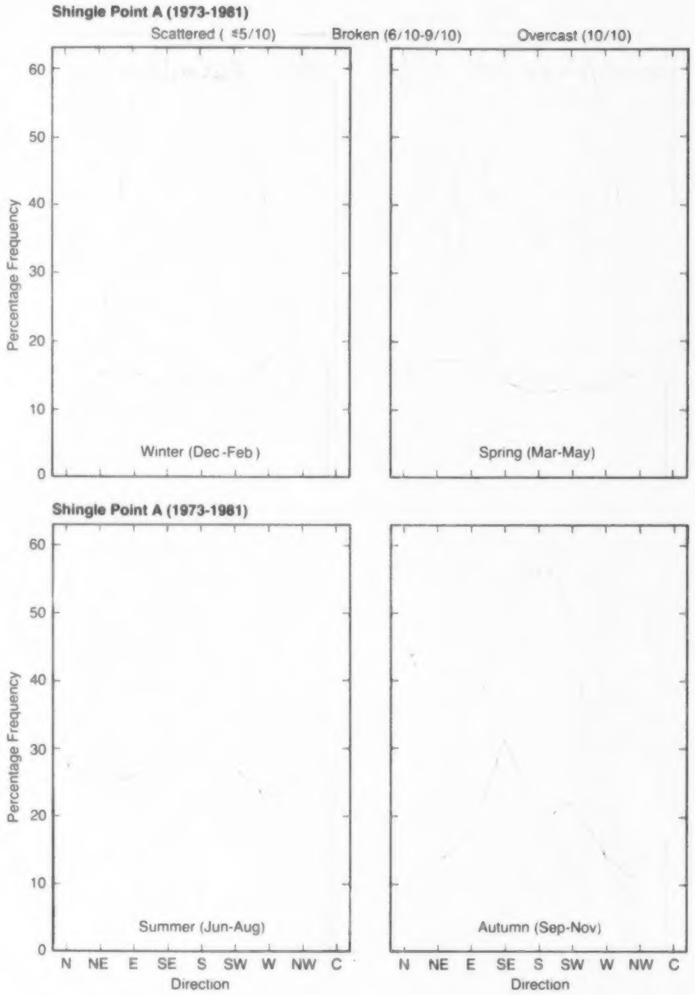


Figure 10.10 Percentage frequency of occurrence of scattered, broken and overcast cloud by wind direction, for each season at Shingle Point A

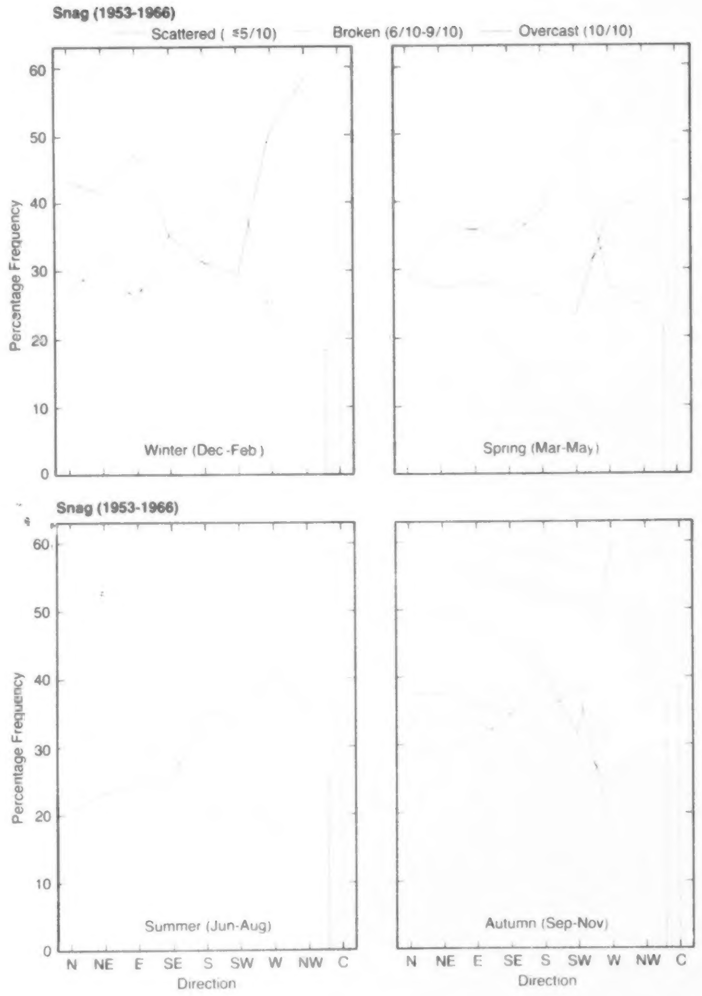


Figure 10.11 Percentage frequency of occurrence of scattered, broken and overcast cloud by wind direction, for each season at Snag A

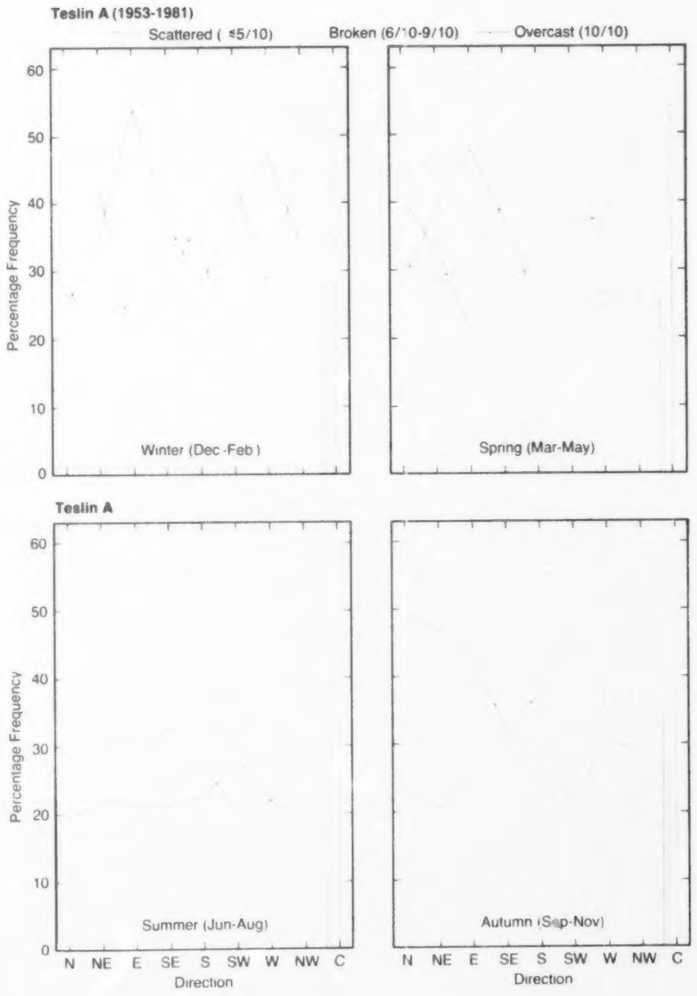


Figure 10.12 Percentage frequency of occurrence of scattered, broken and overcast cloud by wind direction, for each season at Teslin A

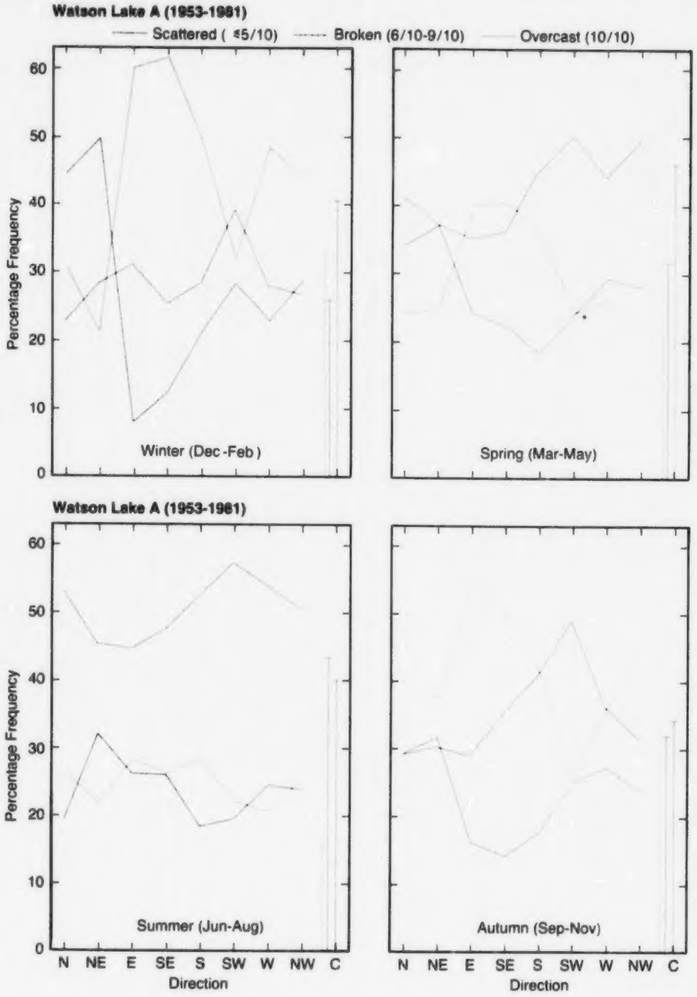


Figure 10.13 Percentage frequency of occurrence of scattered, broken and overcast cloud by wind direction, for each season at Watson Lake A

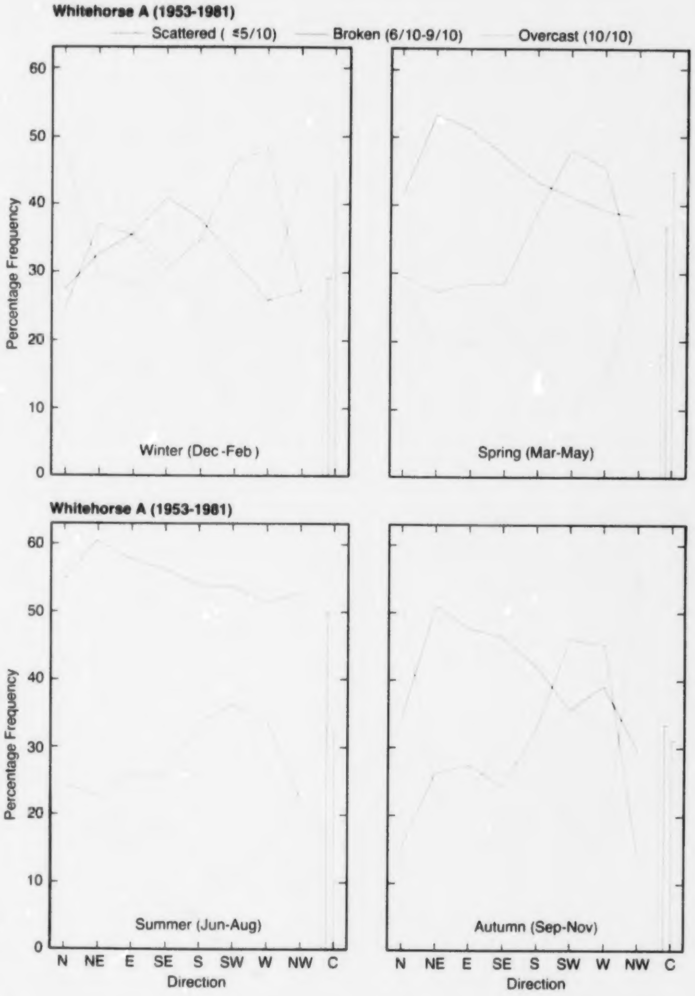


Figure 10.14 Percentage frequency of occurrence of scattered, broken and overcast cloud by wind direction, for each season at Whitehorse A

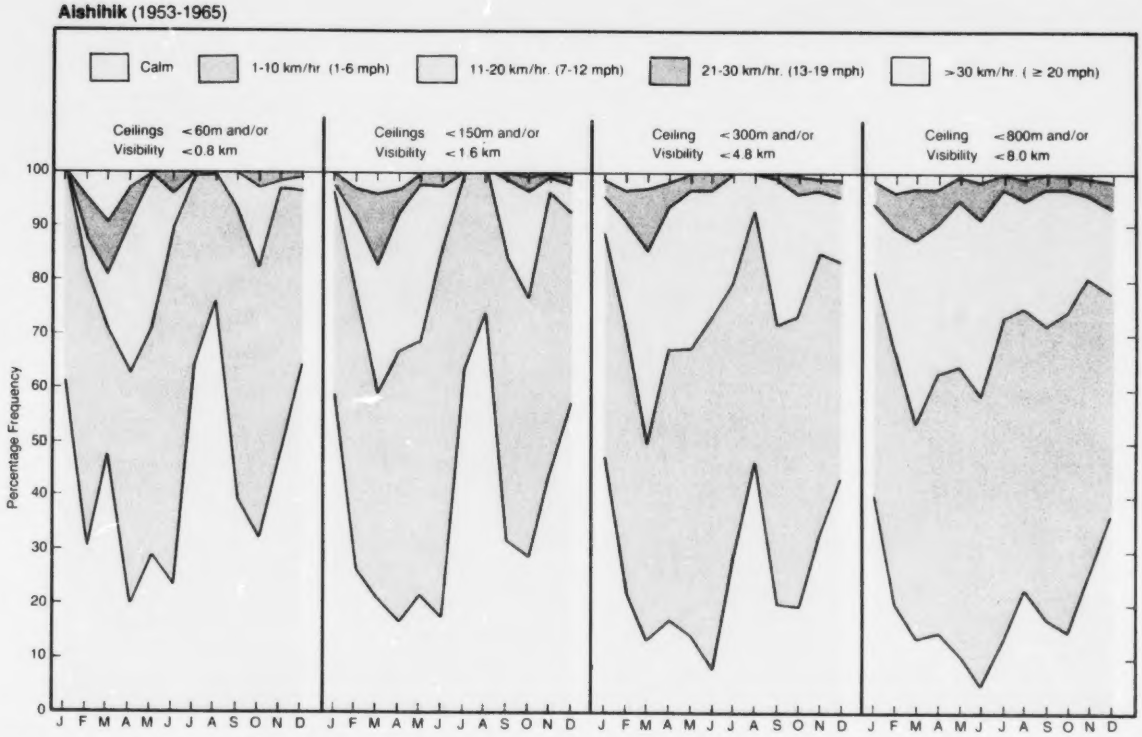


Figure 10.15 Cumulative percentage frequency of occurrence of low ceiling/visibility (below 800 m and/or 8 km) by wind speed class, for each month at Aishihik

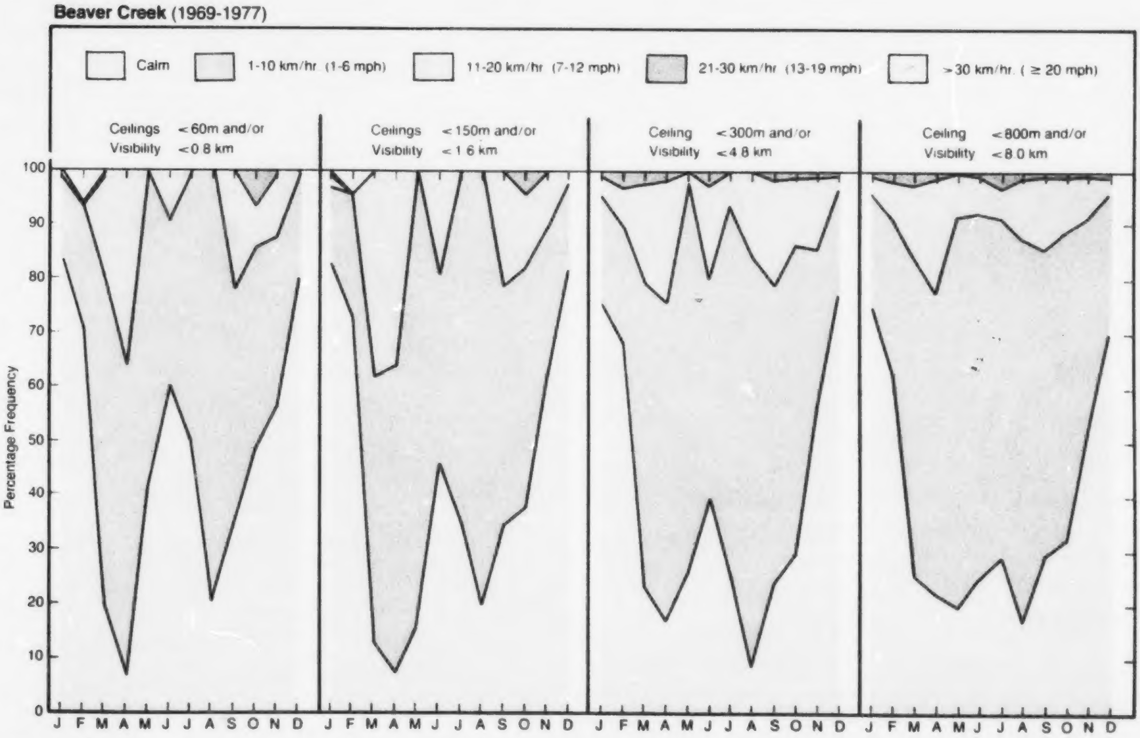


Figure 10.16 Cumulative percentage frequency of occurrence of low ceiling/visibility (below 800 m and/or 8 km) by wind speed class, for each month at Beaver Creek

Burwash A (1967 1981)

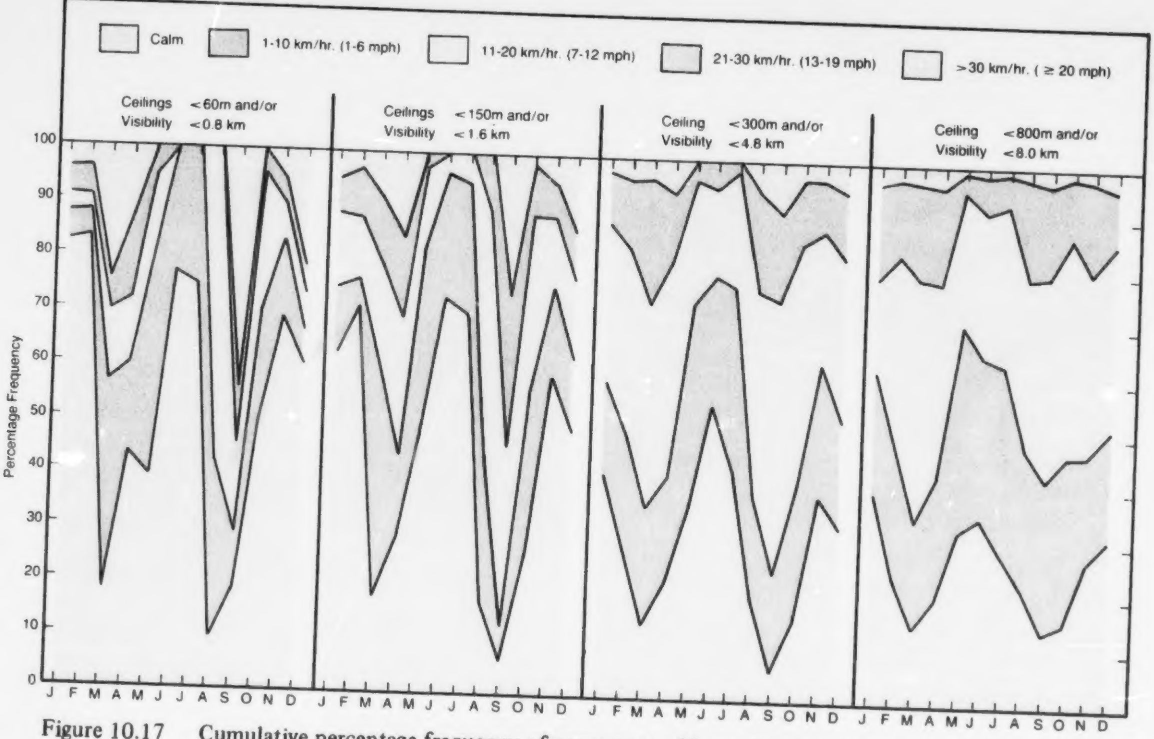


Figure 10.17 Cumulative percentage frequency of occurrence of low ceiling/visibility (below 800 m and/or 8 km) by wind speed class, for each month at Burwash A

Dawson (1953-1976)

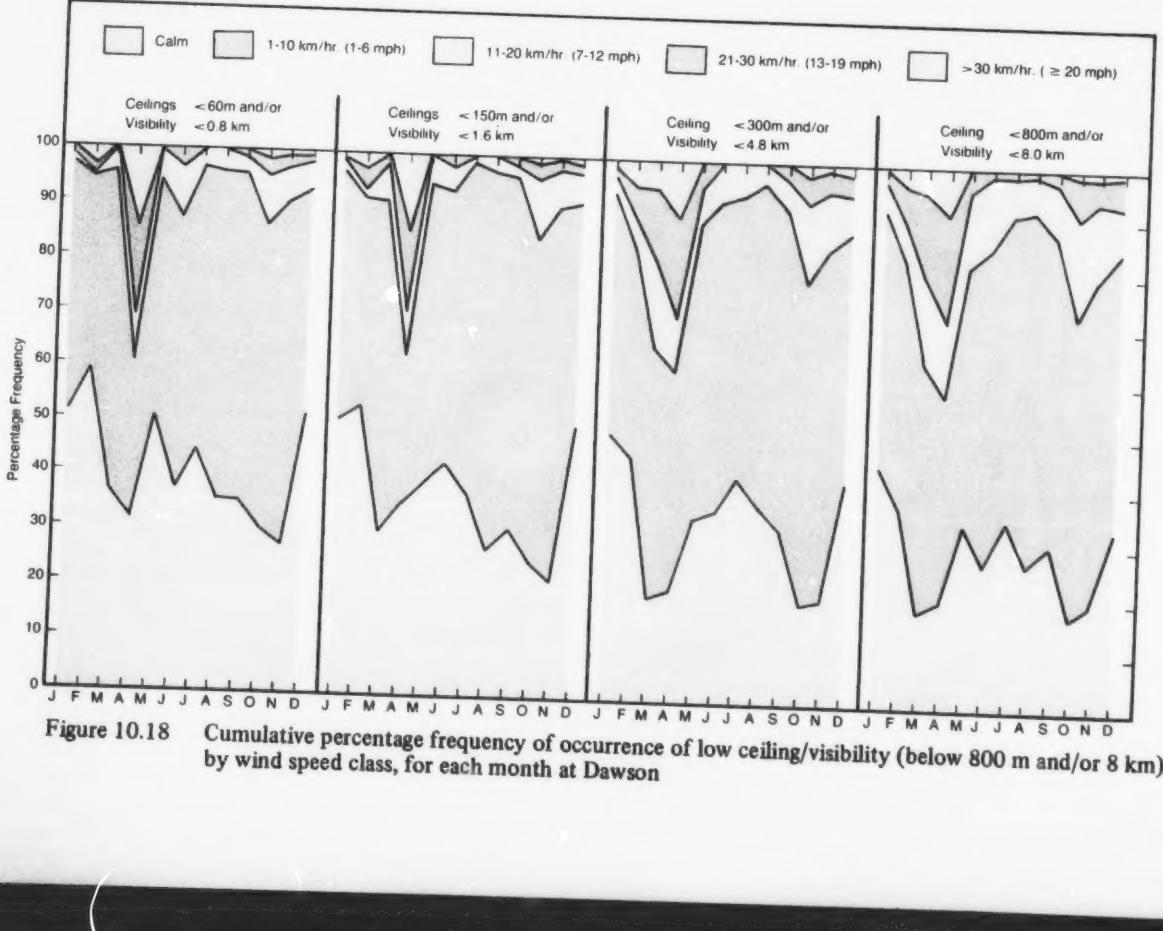


Figure 10.18 Cumulative percentage frequency of occurrence of low ceiling/visibility (below 800 m and/or 8 km) by wind speed class, for each month at Dawson

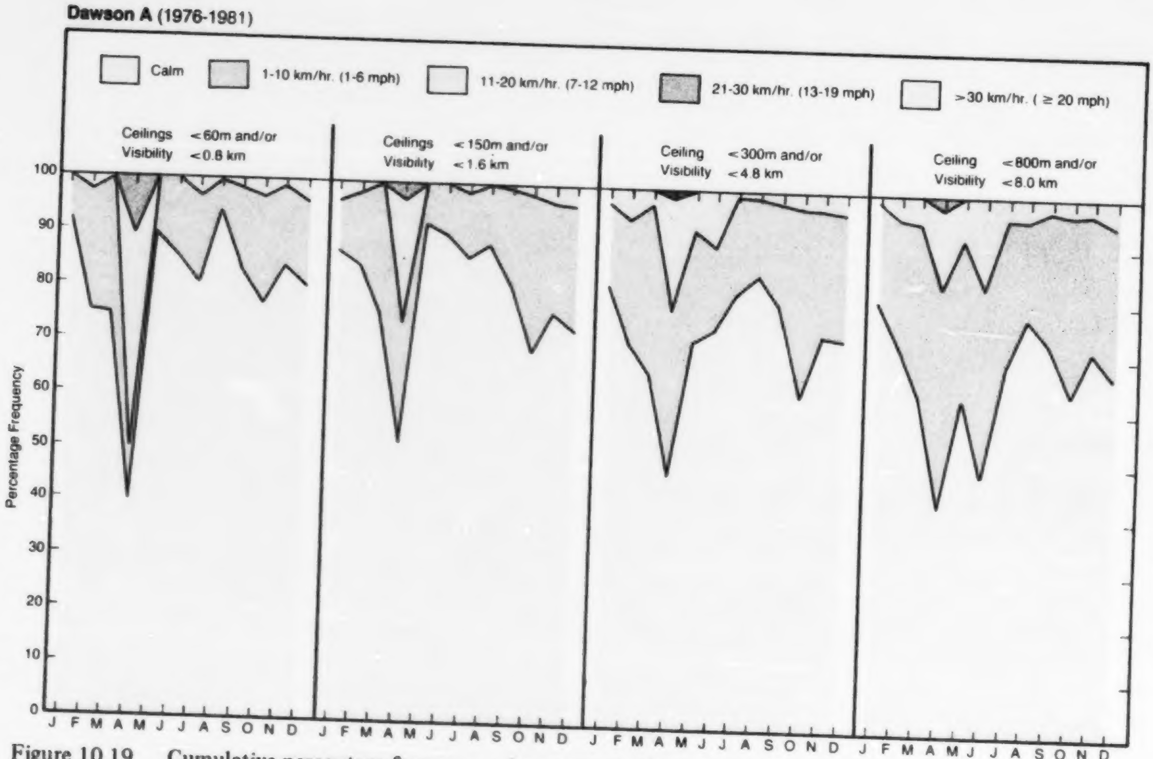


Figure 10.19 Cumulative percentage frequency of occurrence of low ceiling/visibility (below 800 m and/or 8 km) by wind speed class, for each month at Dawson A

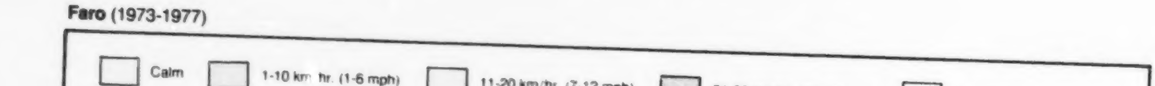
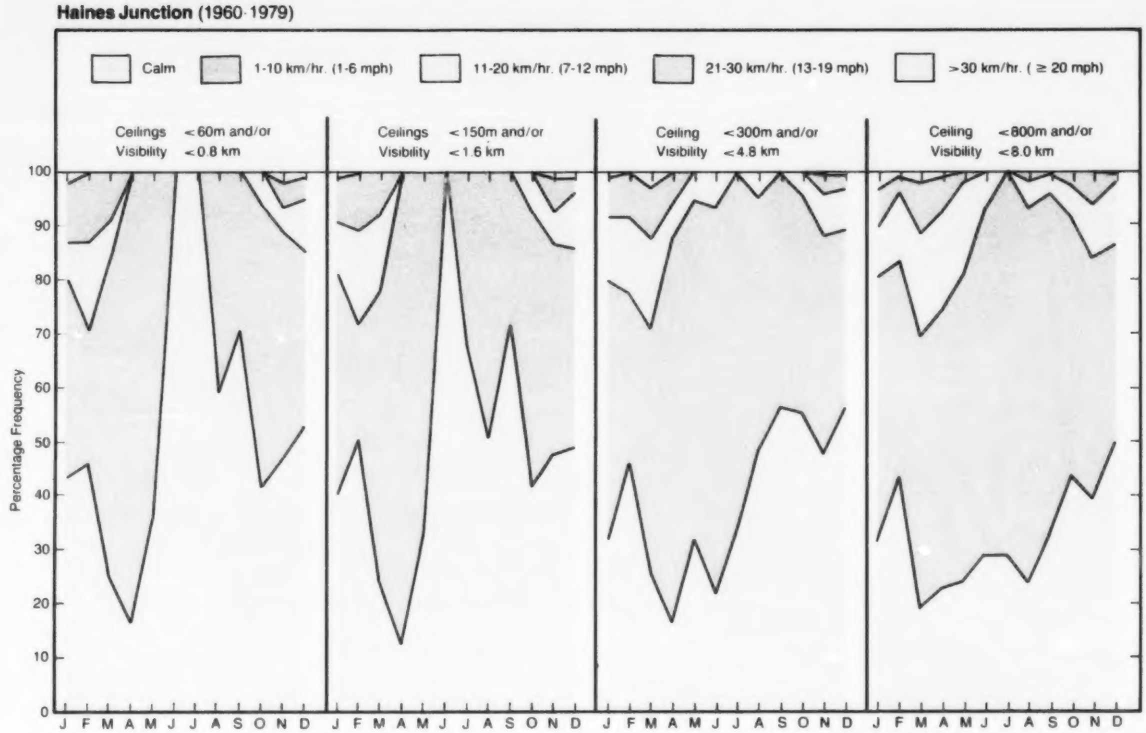
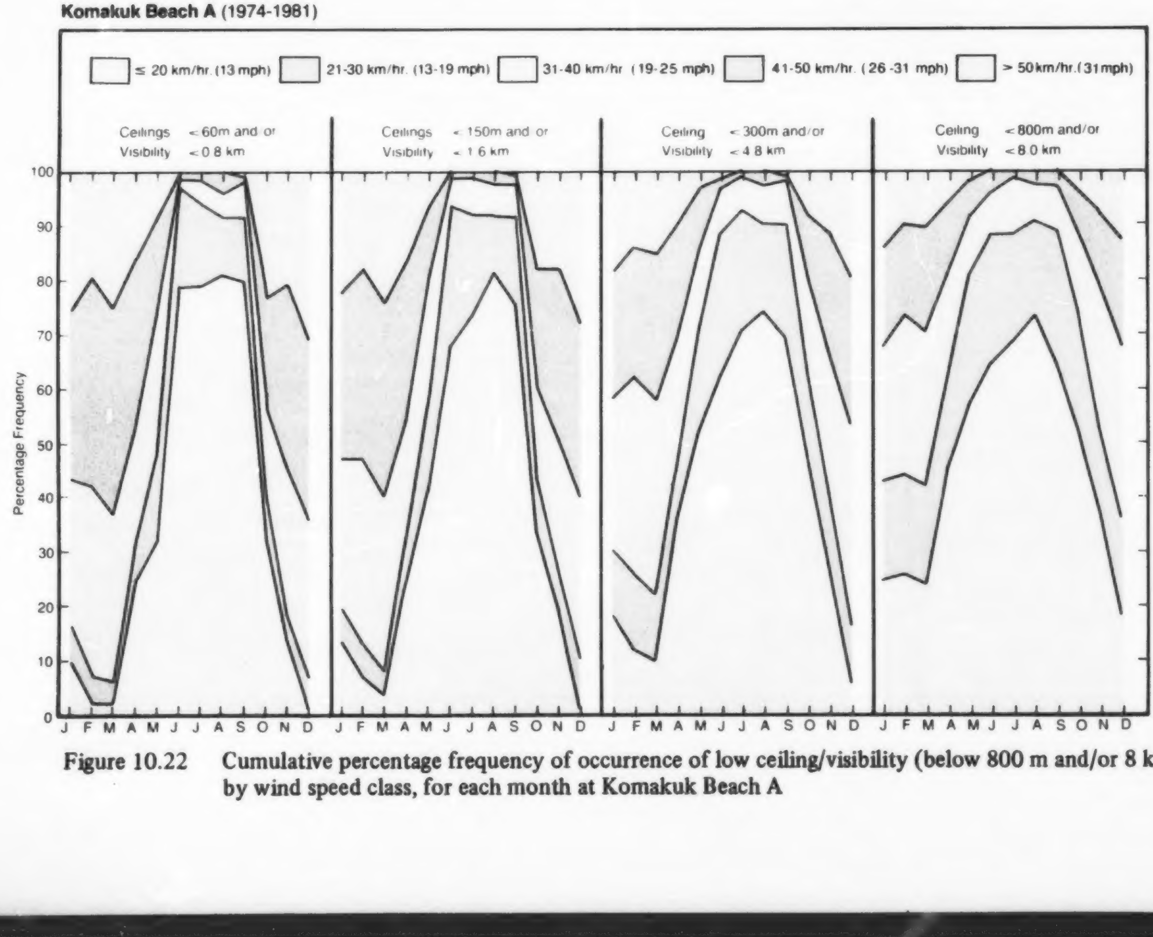


Figure 10.20 Cumulative percentage frequency of occurrence of low ceiling/visibility (below 800 m and/or 8 km) by wind speed class, for each month at Faro



Haines Junction (1960-1979)

Figure 10.21 Cumulative percentage frequency of occurrence of low ceiling/visibility (below 800 m and/or 8 km) by wind speed class, for each month at Haines Junction



Komakuk Beach A (1974-1981)

Figure 10.22 Cumulative percentage frequency of occurrence of low ceiling/visibility (below 800 m and/or 8 km) by wind speed class, for each month at Komakuk Beach A

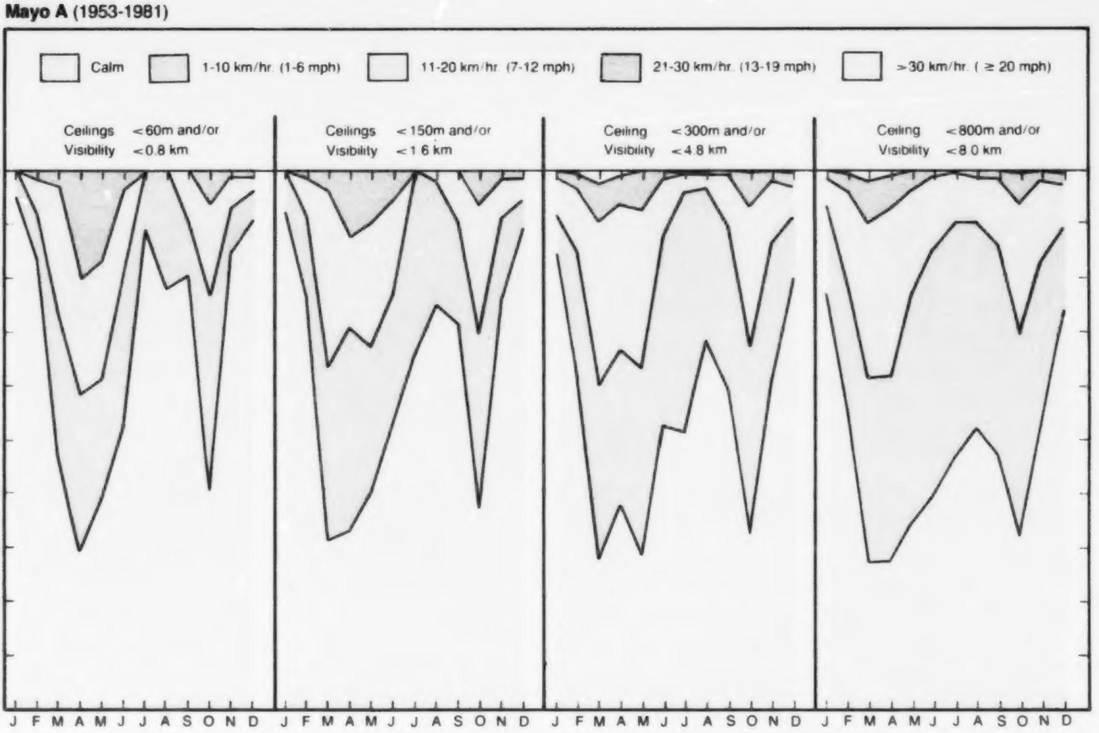


Figure 10.23 Cumulative percentage frequency of occurrence of low ceiling/visibility (below 800 m and/or 8 km) by wind speed class, for each month at Mayo A

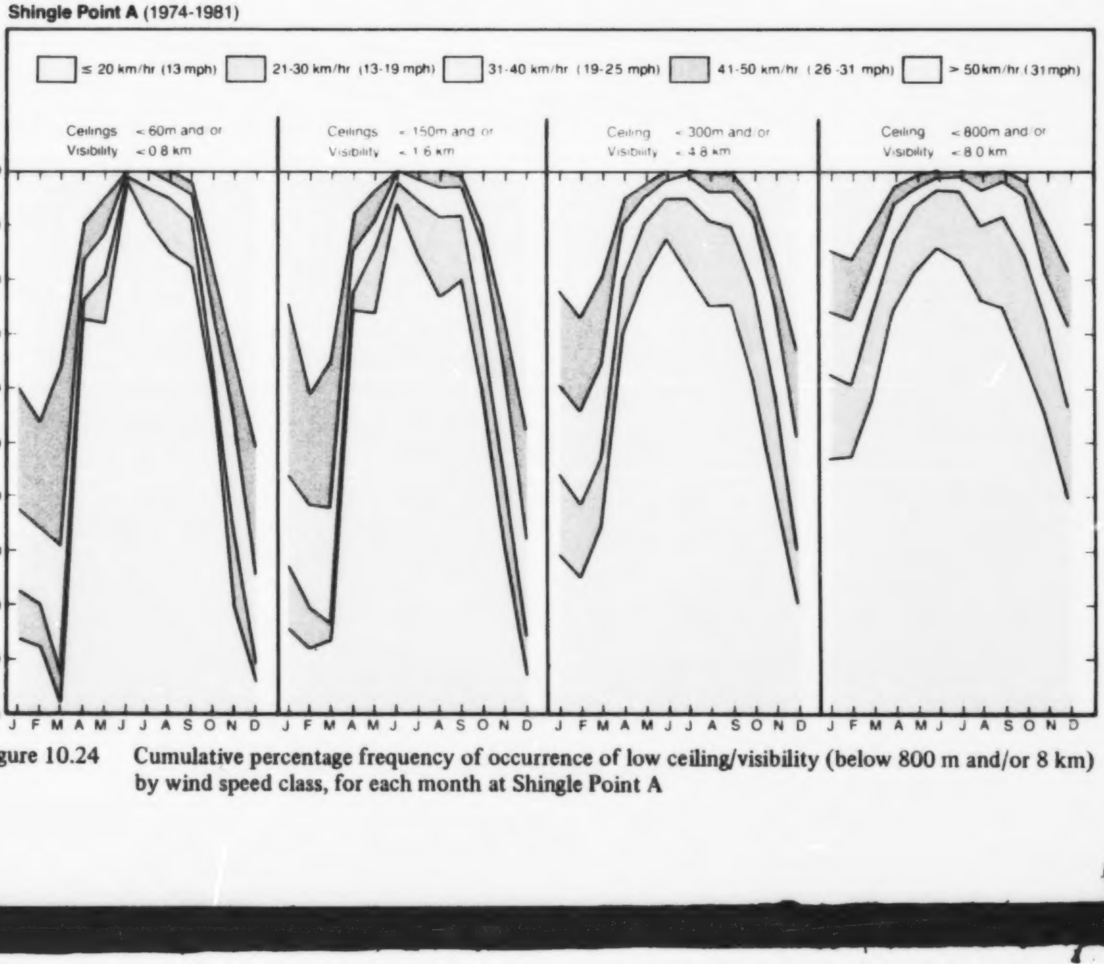


Figure 10.24 Cumulative percentage frequency of occurrence of low ceiling/visibility (below 800 m and/or 8 km) by wind speed class, for each month at Shingle Point A

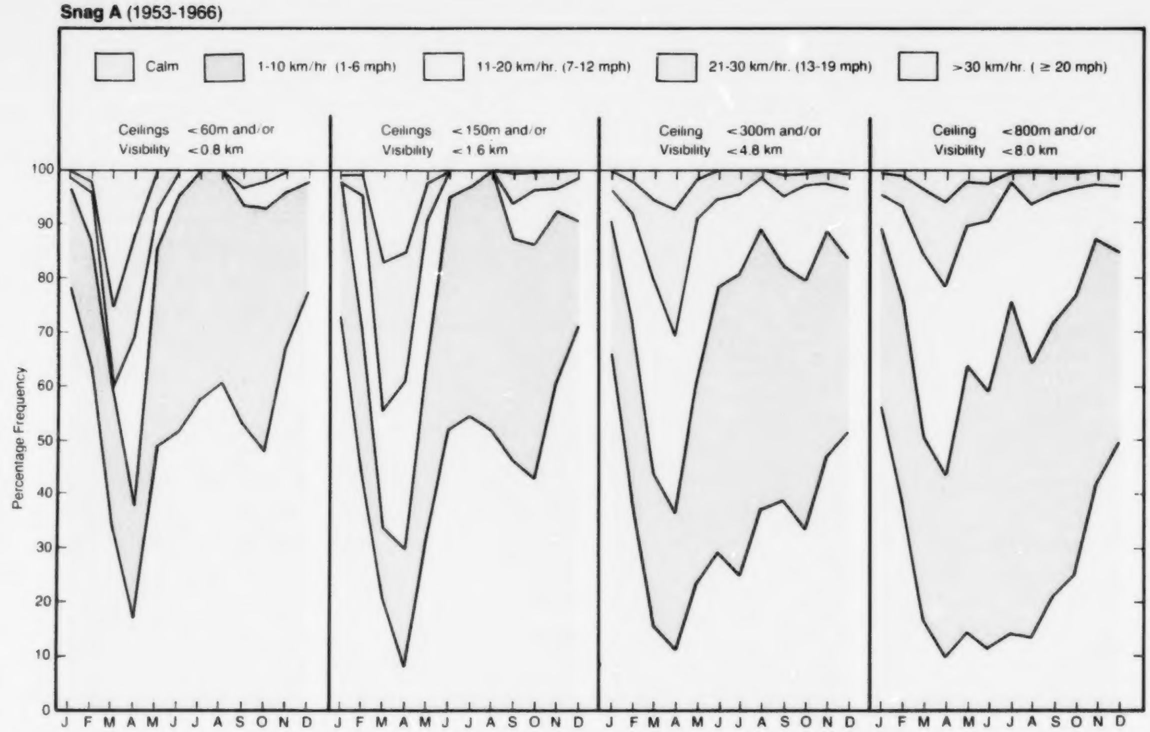


Figure 10.25 Cumulative percentage frequency of occurrence of low ceiling/visibility (below 800 m and/or 8 km) by wind speed class, for each month at Snag A

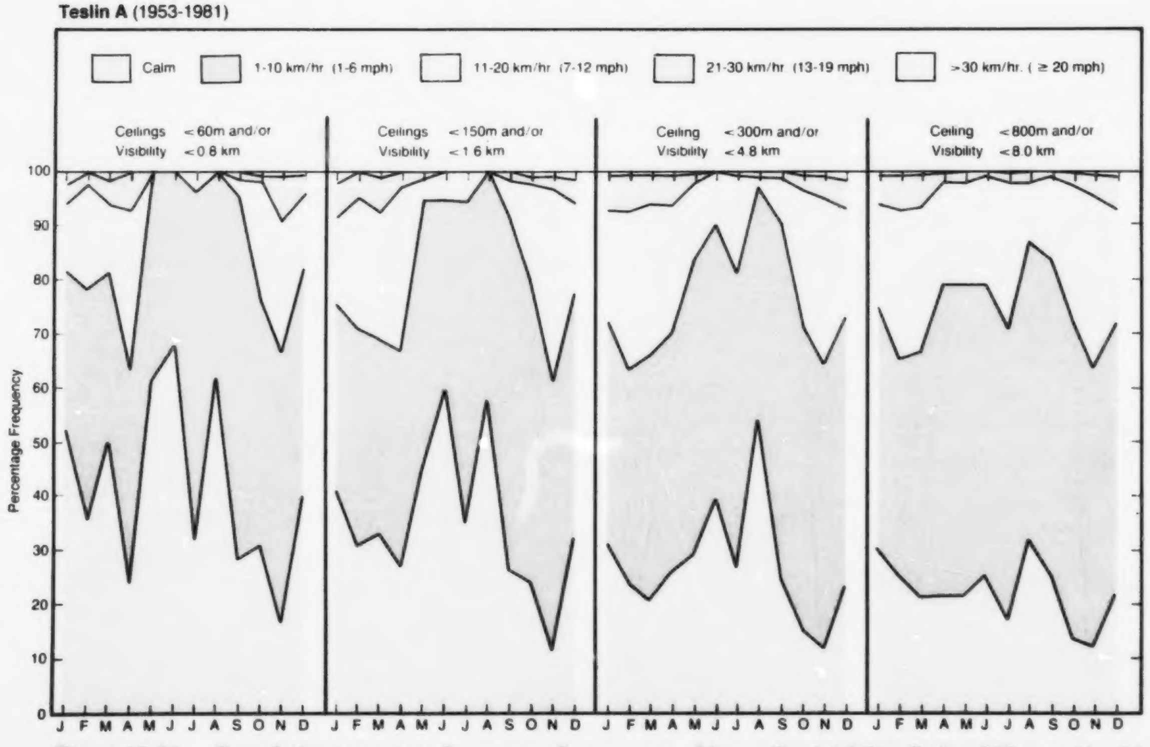


Figure 10.26 Cumulative percentage frequency of occurrence of low ceiling/visibility (below 800 m and/or 8 km) by wind speed class, for each month at Teslin A

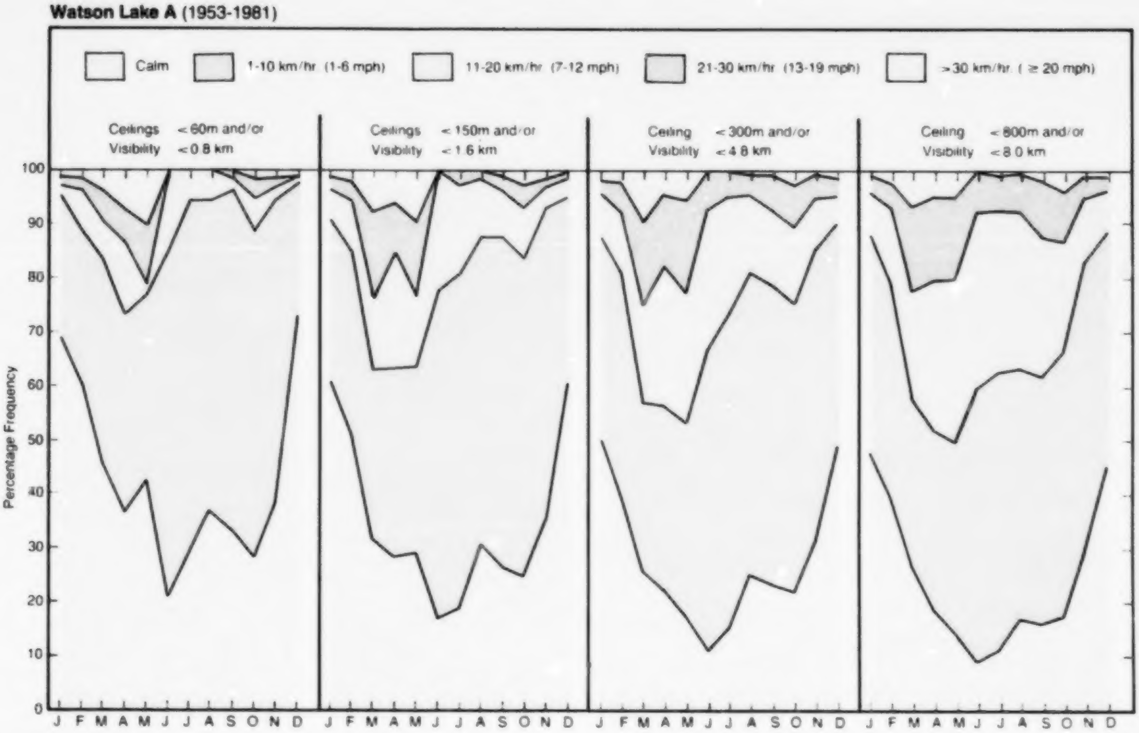


Figure 10.27 Cumulative percentage frequency of occurrence of low ceiling/visibility (below 800 m and/or 8 km) by wind speed class, for each month at Watson Lake A

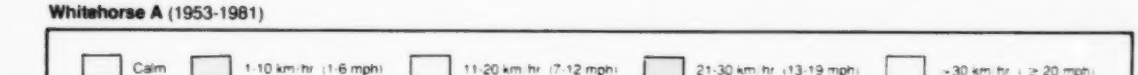


Figure 10.28 Cumulative percentage frequency of occurrence of low ceiling/visibility (below 800 m and/or 8 km) by wind speed class, for each month at Whitehorse A

11. THUNDERSTORMS AND HUMIDITY

11.1 Thunderstorms

Thunderstorms are classified according to the lifting mechanism and amount of moisture: frontal (cold and warm), air mass (convective and/or orographic), and wet or dry. The dry type usually have a high base such that any rain evaporates before reaching the ground. This type can set off the worst wildfires whereas the wet type can sometimes put out fires set by its own lightning. Dry thunderstorms are most common after a dry spell and are associated with the first surge of cold air aloft that breaks down the warm upper ridge. The worst wet thunderstorms are associated with cold lows and can set off devastating floods such as occurred over the Alaska Highway in July, 1974 (section 9.4.2). Thunderstorm occurrence is most frequent between 1500 and 1800 LST.

The frequency of thunderstorms increases with elevation even though the intensity may not match that on the prairies or in eastern Canada (section 9.2). One would expect a much higher frequency of soft hail and graupel in high country relative to lowlands which is consistent with the greater number of days with precipitation and greater total precipitation amounts at the higher elevations. In British Columbia the greatest number of thunderstorm days in the records is at Old Glory Mountain (24/year). Being caught on a mountain under any thunderstorm can be dangerous and is a very frightening experience. Gravity ensures that the mountain will shed excess water quickly so normally dry canyons or depressions can be filled with torrents of water in no time, and dislodged rock and debris can behave like missiles on their way down the mountain side. Wheeler describes such an experience (cited in Janz and Storr, 1977).

Data on thunderstorm frequency in Yukon is limited to a compilation of the mean number of days with thunderstorms at 10 locations. There could be more than one observation of thunder and/or lightning in a day but this is still recorded as only one thunderstorm day. Some thunderstorms have many associated lightning strokes while others have only a few so there is little correlation between lightning occurrence and thunderstorm occurrence.

Snag and Watson Lake report on the average 11 thunderstorm days per year, the most for Yukon stations, while thunderstorms are rare on the north coast. Most interior stations report an average of 4 to 6 thunderstorm days per year, 3 or 4 days less than at valley stations in the contiguous mountain parks of Alberta and British Columbia. July is the month with the highest frequency but there are just as many in June at some stations. Occurrences extend over the May to September period but have been reported as early as March and as late as October; the season is likely longer at higher elevations when strong cooling aloft combines with orographic lift (cold convection) which is likely most common on the Pacific slope of the St. Elias-Coast Mountains region.

Hail is associated with the more severe thunderstorms; of the 10 Yukon stations that record “days with hail”, Dawson A has an average of two per year; Dawson City, Mayo, Snag and Watson Lake record an average of only one per year; none has been recorded at Komakuk Beach or Shingle Point on the north coast.

These data do not give any real information on frequency of lightning strokes. Modern forest services are equipped with lightning detection systems of varying degrees of sophistication. They detect lightning stroke location, tabulate the number of occurrences over a given area in a specified interval of time and output displays of selected parameters. Outputs from the system employed by the Yukon Forest Service are also available to the Yukon Weather Office. Such systems demonstrate that patterns of lightning strikes are complex but appear to be elevation dependent. Considerable research is required to determine the cause and behaviour of these patterns. Mountain ranges appear to have a channeling effect on the movement of thunderstorms but the exact mechanism is not well understood.

11.2 Humidity

The water content of the air can be expressed in a number of ways but the relative humidity is probably the most common. Other parameters such as dew-point and absolute humidity represent the actual moisture content while the relative humidity indicates the degree of saturation at a given dry bulb temperature. The higher the dry bulb temperature of the air, the more water vapour it can hold before saturation occurs; for about every 11°C increase in dry bulb temperature the capacity of a given volume of air to hold water vapor doubles. When the air becomes saturated, any further cooling or addition of water vapor will result in condensation to form fog, cloud, then possibly precipitation.

A cool dry air mass may actually have a higher relative humidity than a warm moist air mass depending on the degree of saturation in each. For example, in an arctic air mass in winter the outside air can hold very little water vapor but its relative humidity may be near or at saturation. Drawing that same air indoors and heating it will produce a warmer air mass but with a much reduced relative humidity. Such air must be "humidified" (add water vapour) to create a reasonable level of human comfort. An unfortunate characteristic of relative humidity is that people usually associate high values of relative humidity with closeness and discomfort. This is true only when high relative humidities are accompanied by high dry bulb temperatures; such conditions are rare indeed in Yukon.

Relative humidity is a very important parameter in fire weather applications as the moisture content of forest fuels is most dependent on relative humidity as seen in Figure 11.1. The range in moisture content of six fuel types is quite small over a wide range in temperature for a given relative humidity. This implies that high daytime temperatures are not as important as the overnight recovery to high humidity in the loss of fuel moisture content. Typical traces of hourly values of temperature and relative humidity at low level stations are essentially mirror images of each other but the patterns are more complex in mountainous terrain. Schroeder and Buck (1970) give a complete discussion of humidity and its application to fire weather.

The mean relative humidity at selected Yukon stations by months is given for 01LST and 13LST in Table 11.1 from the 1951-1980 normals. According to the 3-hourly observations the time of minimum relative humidity during the day is closer to 15LST while the time of maximum relative humidity is near 06LST except 03LST in May, June and July. At valley stations the time of maximum relative humidity is close to the time of minimum temperature occurrence and the minimum relative humidity near the time of maximum temperature.

It can be seen from Table 11.1 data that during the winter there is little diurnal variation in relative humidity when there is a net loss in radiation. The high values in this season are not very significant as the air is so cold that it can not hold much water vapor. May experiences the lowest values then June and thirdly July. The trend to increasing moisture during the growing season is mainly due to the import of air masses from mid-latitudes and transpiration of moisture from plants and forests.

Durations of periods with minimum relative humidity (in selected conditions) equal to or less than 40% for March to September for five central and southern Yukon locations are given in Tables 11.2 to 11.6. The distribution of the numbers in the tables gives an indication of the peak dry periods. For example, at Mayo (Table 11.3) there is a definite maximum in April-May while at other localities the maximum does not drop off quite so quickly with the longer durations (15-30 days) occurring as well in June and even July.

As an example, at Dawson in March there was only one occurrence over the entire period of record when the minimum relative humidity was less than or equal to 25% and only for one day. For the minimum relative humidity condition equal to or less than 25% in May there were 65 occurrences lasting 1-3 days, 8 occurrences lasting 4 to 7 days, and one in the 8-14 day range which was 9 days (the longest duration). In May for the 40% condition there were a total of 39+14+12+5=70 occurrences and of the 5 in the 15 to 30 days range the longest was 27 days. In June for the same condition there were a total of 72 occurrences and of the 3 in the 15 to 30 day range the longest was 27 days (same as in

May). These tables are intended to give an indication of occurrences of consecutive duration of low relative humidity conditions particularly of interest in forestry applications.

A study of the relation of components of the Fire Weather Index to monthly provincial area burned by wildfire in Canada 1953-1980 by Harrington *et al.* (1983) shows that the most severe fire weather conditions in Yukon prevail in June. Although relative humidity is on the average lower in May than June, it takes time for the forest fuels to dry out. Also the incidence of lightning is greater in June as well as the frequency of extreme maximum temperatures. The worst fire season on record occurred in the summer of 1969 with 138 fires of which 92 were in the month of June. The distribution of 15 large fires included: Carmacks 5, Dawson 2, Mayo 1, Ross River 3, Teslin 1 and Watson Lake 3. A forest fire descended a draw to destroy half the townsite of Faro when it was under construction, as well as much of the surrounding forest. The synoptic pattern associated with the peak of the hot-dry spell is depicted in Figure 12.8.

TABLE 11.1

Mean Relative Humidity (%) for Selected Hours (LST) for 1951 – 1980

STATION	TIME (LST)	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	YR.
Aishihik A	01	80	81	80	78	77	80	83	80	85	81	82	81	81
	13	79	75	67	61	48	51	55	59	59	68	79	79	65
Burwash A	01	77	78	78	77	75	75	80	81	81	79	80	80	78
	13	78	73	65	55	47	48	58	57	58	67	78	79	64
Dawson	01	80	80	80	79	77	82	86	90	87	86	82	81	83
	13	80	77	70	57	44	45	52	59	65	79	80	81	66
Dawson A	01	82	81	81	80	74	81	85	86	88	89	86	81	83
	13	82	78	75	54	39	44	48	52	65	81	84	82	65
Mayo A	01	82	79	80	74	71	77	83	85	84	82	85	84	81
	13	79	76	66	52	43	46	52	56	61	74	81	82	64
Snag A	01	85	85	83	78	77	84	88	91	90	89	87	84	85
	13	84	80	68	54	45	47	55	57	62	78	84	84	67
Teslin A	01	82	81	78	75	75	74	77	83	85	82	82	83	80
	13	78	74	66	55	44	45	52	55	60	67	78	80	63
Watson Lake A	01	76	78	79	76	74	73	77	80	83	82	83	78	78
	13	75	73	63	49	42	43	48	51	58	67	79	76	60
Whitehorse A	01	77	75	73	69	67	68	71	76	79	77	80	79	79
	13	75	70	60	48	39	41	47	51	56	65	76	78	59

TABLE 11.2

Frequency of Specified Duration Ranges (Days) of Specified Conditions of Minimum Relative Humidity

STATION: Dawson 01/1955 – 01/1976

MONTH	RH COND. (%)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
MARCH	≤25	1					1
	≤30	6					1
	≤35	14					2
	≤40	23	1				4
APRIL	≤25	12	3				7
	≤30	36	2	1			10
	≤35	50	7	3	1		17
	≤40	61	11	6	1		22
MAY	≤25	65	8	1			9
	≤30	63	17	4	2		22
	≤35	56	21	7	2		22
	≤40	39	14	12	5		27
JUNE	≤25	53	6	2			14
	≤30	56	6	4	1		25
	≤35	50	16	5	2		25
	≤40	43	19	7	3		27
JULY	≤25	28	1				4
	≤30	44	5				6
	≤35	54	10	2			8
	≤40	62	14	5	1		15
AUGUST	≤25	6					3
	≤30	23	2				6
	≤35	32	7				7
	≤40	46	12				7
SEPTEMBER	≤25	12					2
	≤30	19	1				5
	≤35	30	3				7
	≤40	46	4	1			8

TABLE 11.3

Frequency of Specified Duration Ranges (Days) of Specified Conditions of Minimum Relative Humidity

STATION: Mayo A 01/1955 – 12/1983

MONTH	RH COND. (%)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
MARCH	≤25						0
	≤30	2					2
	≤35	6	1				4
	≤40	18	1				5
APRIL	≤25	18	2				5
	≤30	25	7				7
	≤35	29	8	5	1		22
	≤40	28	11	5	2	1	31
MAY	≤25	48	6	1			8
	≤30	51	12	3	2		21
	≤35	40	15	6	2		25
	≤40	27	12	6	5		27
JUNE	≤25	37	4				5
	≤30	50	12				7
	≤35	45	15	3			10
	≤40	34	20	9			12
JULY	≤25	14	1				5
	≤30	38	4				5
	≤35	48	12	1			9
	≤40	47	16	5			12
AUGUST	≤25	5	1				4
	≤30	25	2				5
	≤35	26	7	2			11
	≤40	44	5	6			11
SEPTEMBER	≤25	1					1
	≤30	10	1				5
	≤35	26	1				5
	≤40	30	3	4			9

TABLE 11.4

Frequency of Specified Duration Ranges (Days) of Specified Conditions of Minimum Relative Humidity

STATION: Teslin A 01/1955 – 12/1970

MONTH	RH COND. (%)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
MARCH	⩽25	1					1
	⩽30	3					1
	⩽35	10					2
	⩽40	28	1				6
APRIL	⩽25	12					3
	⩽30	21	3				5
	⩽35	46	6	1			8
	⩽40	60	8	6			10
MAY	⩽25	44	3				7
	⩽30	66	11	1			13
	⩽35	67	18	6	1		15
	⩽40	50	23	7	4		20
JUNE	⩽25	35	3	1			12
	⩽30	51	8	1			12
	⩽35	59	14	3			12
	⩽40	53	18	7	1		15
JULY	⩽25	32					3
	⩽30	41	7				6
	⩽35	50	12	2			8
	⩽40	59	14	6			14
AUGUST	⩽25	7					3
	⩽30	27	1				4
	⩽35	48	2	1			8
	⩽40	67	8	2			9
SEPTEMBER	⩽25	7					2
	⩽30	15					2
	⩽35	35					3
	⩽40	44	6				5

TABLE 11.5

Frequency of Specified Duration Ranges (Days) of Specified Conditions of Minimum Relative Humidity

STATION: Watson Lake A 01/1955 – 08/1971

MONTH	RH COND. (%)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
MARCH	⩽25	2					1
	⩽30	3					3
	⩽35	7					3
	⩽40	17	1				4
APRIL	⩽25	15	2	1			8
	⩽30	34	4	2			8
	⩽35	66	6	5			10
	⩽40	55	13	7	3		18
MAY	⩽25	54	6				7
	⩽30	74	18	2			10
	⩽35	60	21	9	1		18
	⩽40	36	19	8	6	1	36
JUNE	⩽25	47	3				5
	⩽30	58	9	3			14
	⩽35	47	17	6	1		17
	⩽40	37	15	7	3		17
JULY	⩽25	30	1				4
	⩽30	53	4	2			11
	⩽35	70	13	2			12
	⩽40	48	21	5	1		19
AUGUST	⩽25	18					3
	⩽30	27	4				7
	⩽35	51	10	1			8
	⩽40	59	15	4			11
SEPTEMBER	⩽25	10					2
	⩽30	23					3
	⩽35	40	2				7
	⩽40	50	8	2			9

TABLE 11.6

Frequency of Specified Duration Ranges (Days) of Specified Conditions of Minimum Relative Humidity

STATION: Whitehorse A 01/1955 – 12/1983

MONTH	RH COND. (%)	RANGES (DAYS)					
		1 TO 3	4 TO 7	8 TO 14	15 TO 30	31 TO 9999	LONGEST DURATION
MARCH	⩽25	2					1
	⩽30	10					2
	⩽35	33	2				5
	⩽40	61	7	1			12
APRIL	⩽25	26	6				5
	⩽30	69	10	1	2		16
	⩽35	97	17	6	2		27
	⩽40	85	25	11	3	3	36
MAY	⩽25	86	16	2			13
	⩽30	126	23	7	1		15
	⩽35	75	33	15	5		27
	⩽40	42	24	21	8		29
JUNE	⩽25	82	12	1			12
	⩽30	102	33	2			14
	⩽35	84	29	11	3		17
	⩽40	45	22	18	8		24
JULY	⩽25	51	8				5
	⩽30	88	16				7
	⩽35	115	25	5			13
	⩽40	82	32	12	2		18
AUGUST	⩽25	26	1				5
	⩽30	60	9				5
	⩽35	120	8	4			11
	⩽40	121	24	8			13
SEPTEMBER	⩽25	9					1
	⩽30	39					3
	⩽35	83	2				4
	⩽40	100	12				7

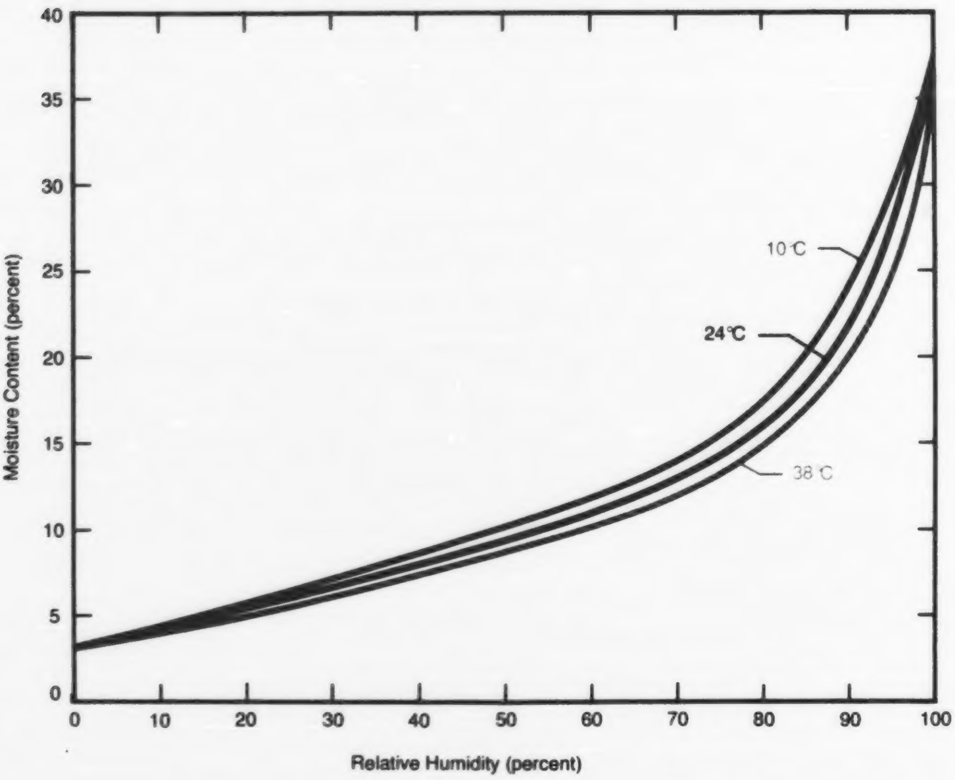


Figure 11.1 Dependence of equilibrium moisture content (averaged for 6 fuel types) on relative humidity and temperature (Schroeder and Buck, 1970)

12. SYNOPTIC CLIMATOLOGY

Under the general circulation pattern of the northern hemisphere there is a constant, generally west to east, progression of pressure systems. The geographic distribution of mountain barriers, continents and oceans, major ocean currents, and the location of the jet stream determine the preferred tracks for these systems. For example, on the macroscale a long-wave ridge aloft prevails over Alaska and Yukon much of the year because the western Cordillera acts as its anchor (Figures 12.2-12.5).

In summer, the most persistent feature of the pressure pattern over the Pacific and continental northwest is the large high pressure cell at mid-latitudes. In mid-summer the Pacific High is at its strongest while in the north a weak trough prevails from Siberia through the northern Bering Sea to northwest Alaska.

In winter, a major low pressure centre over the Aleutians dominates the pattern. It becomes organized in fall, and more intense as it assumes its normal dominant position in the northeastern Pacific as winter progresses. Some off-shoots from the parent low move across Bering Strait into the Beaufort Sea to affect Yukon.

At high latitudes in winter, an immense cold high pressure area dominates Siberia with a ridge extending eastward into the Canadian sector of the Beaufort Sea. By January a major cell of high pressure prevails over the central Yukon-Mackenzie Mountain sector. The Siberian High dissipates rapidly in spring and low pressure prevails over the Arctic basin and much of Siberia in summer.

The most important feature causing changeable weather in Yukon is the elongation of the Aleutian Low into the Gulf of Alaska. During the fall and winter seasons there are many more storms moving into and/or developing in the Gulf of Alaska than in any other area in the northern hemisphere. While individual lows generally spiral into the Gulf and stall, the associated weather often spreads, in a modified form, across the St. Elias-Coast ranges into Yukon. These systems affect mainly the southern half of Yukon.

These macro-and synoptic scale weather systems create the general wind flow, cloud and precipitation regimes in Yukon. They import cold or warm air, depending on the orientation of seasonal storm tracks.

12.1 Air Masses

Air masses are recognized as extensive bodies of air which, due to their different origins, can be distinguished by their relatively uniform temperature, water content and stability, even though there are seasonal variations. Several types move over Yukon. The dominant air masses are, of course, of Arctic origin but characteristics vary depending on their trajectory before reaching Yukon.

Continental Arctic (cA): True cA is a winter airmass resulting from the intense radiational cooling at high northern latitudes. This results in a typical inversion profile, various forms of which are shown in Figure 8.1. The air is cold with negligible water content except in late fall and early winter when a shallow surface layer can become quite moist due to evaporation from open water areas warmer than the air. The cA air mass is at its coldest and deepest during January and February. The interior basins and deep valleys of Yukon can in fact create this type of air mass under stagnant conditions which enhance radiational cooling in winter.

Modified Continental Arctic (mcA): This is the arctic airmass of spring, summer and fall. Its source region is the permanent arctic ice-pack which in summer is covered with puddles of melt water. The mcA is warmer and more moist than cA but still fairly stable. The stability confines the moisture to the lowest levels. Low stratus cloud and fog are common offshore but as the air moves inland it is rapidly warmed if the surface is free of snow, which transforms the weather to instability cloud with good visibility a few kilometres inland.

Maritime Arctic (mA): This is arctic air modified by a trajectory over relatively warm water such as the north Pacific or the Bering Sea when it is ice-free. It also becomes increasingly unstable as it moves inland giving rise to cumulus and stratocumulus cloud, often of sufficient development to produce showers, which at times can be quite extensive.

The arctic front, (the line or zone separating the arctic airmass from the warmer airmass), is most often along the interior slope of the St. Elias-Coast Mountains in winter and over the Beaufort Sea or along the north slopes of the British Mountains in summer. Findlay and Treidl (1977) cited a major airmass and wind trajectory analysis by Bryson (1966) which demonstrated a close relationship between the tree line in Canada and the median position of the arctic front in summer. This correspondence has also been shown to occur in Eurasia by Krebs and Barry (1970).

The modification that can occur to arctic air masses in winter is very dramatic. Extremely cold cA air moving over the western Gulf of Alaska may warm 40 to 50°C in the lower levels. The air rapidly becomes very unstable, and with the moisture gained, towering cumulus or cumulonimbus with snow showers, and occasionally thunderstorms develop. The air, as it reaches the coastal mountains of Alaska and B.C., creates extensive cloud and heavy precipitation on the outer slopes. By the time the air reaches Yukon, much of the moisture has been removed by the mountain barrier. In winter, with insignificant solar heating, instability cloud over the interior is rare, so skies are relatively clear. Moderating temperatures develop at lower elevations as the subsiding air to the lee of the mountains reaches the valley floors.

Maritime Polar (mP): This air, which originates in mid-latitudes, is often associated with warm spells in Yukon. At this latitude it is fairly stable and quite moist although the lower levels are frequently dry after passing over the coastal mountains. In winter it reaches the southern Yukon in association with the more intense Gulf storms, bringing extensive cloud and precipitation. On rare occasions, when it reaches the valley floors in south-central Yukon it creates balmy mid-winter thaws. In summer, this mP air frequently prevails over Yukon at all levels and, although the cloud cover is not as extensive as in winter, provides some of the heaviest precipitation.

Maritime Tropical (mT): This very warm airmass develops in the equatorial regions. Its moisture, initially at low levels, spreads upward on the journey northward. MT air reaches Yukon only occasionally, then just at high levels. Its most frequent occurrence is in the fall in association with Gulf of Alaska storms which originated as typhoons. On rare occasions it may come from the Gulf of Mexico northward over the continent to be entrained in a developing storm to the lee of the Rockies or Mackenzie Mountains. Some of these systems give heavy rains over eastern Yukon. These warm airmasses contain the highest moisture content and when they reach high latitudes can cause unusual or extreme weather.

The temperatures aloft of course vary with the airmass and season. Mean lapse rates for seasonal months at selected stations are given in Table 8.1 and upper air temperature profiles in Figures 8.2-8.4. Whitehorse is typical of the south while the profile for Inuvik is reasonably typical of the Yukon Coastal Plain.

Air masses reflect the range of temperature and moisture availability in a given region.

12.2 Mean 50-kPa Patterns for Mid-season Months and Storm Tracks

The surface (MSL) pressure patterns for January, April, July, and October for Yukon are shown in Figures 7.1 to 7.4. The 50-kPa patterns for the same months and vector winds at standard levels in the atmosphere over Whitehorse are shown in Figures 12.2 to 12.5.

Reitan (1974) used the mean frequency of cyclone events and frequency of cyclogenesis over the 20-year period 1951 to 1970 to determine cyclone tracks for mid-season months. Areas of most frequent cyclogenesis coincide with the origin of each track. Reitan did not examine anticyclones. Zishka and Smith (1980) studied the climatology of both cyclones and anti-cyclones in January and July over a 28-year period, 1950 to 1977. Area distributions, genesis, decay and relative variability were analysed and preferred probable tracks were determined.

Storm corridors (composite cyclone tracks) affecting Yukon are displayed in Figure 12.1. These are based on the aforementioned work as well as that of Klein (1957), Berry *et al.* (1953), and the collective synoptic experience of the authors. This provides a composite summary of common tracks. The reader should note, however, that storms do occasionally take quite different tracks. For example, lows moving north to northeast through B.C. to Yukon or the Mackenzie Valley, notably in the fall, can cause considerable cloud and precipitation in southeastern Yukon.

A descriptive summary for conditions in mid-season months follows:

January: An upper ridge over Alaska results in west to northwest winds in the upper atmosphere over Yukon (Figure 12.2). At 85-kPa over Whitehorse, however, south-southeast winds are quite frequent. This is not surprising as the mean surface pattern is dominated by a high pressure cell centres northeast of Whitehorse, with a low in the Gulf of Alaska. This combination results in a significant southeasterly flow over south-western Yukon (Figure 7.1).

The cells of high pressure at the surface usually migrate from Siberia or the Arctic Ocean then stall over the central Yukon and Mackenzie Mountains. Periodically, portions or occasionally the whole cell will move southward causing cold outbreaks throughout western Canada. They track southeast over the prairies or south over B.C.

Intense storms crossing the north Pacific maintain a mean low pressure centre just south of the Aleutian Islands. Many individual storms end up in the Gulf of Alaska. Occasional bands of cloud and precipitation do reach southern Yukon from Gulf Storms, but generally Yukon is cold and dry due to the dominant anticyclonic circulation. At the outset of a cold spell, temperatures aloft are also very low but prevailing westerly winds at high levels soon bring in milder air. Very cold air persists at low levels and further radiational cooling as well as the warming aloft accentuates the Arctic inversion.

An interesting secondary storm track across the Bering Sea then eastward (Figure 12.1) will bring mild temperatures, but with strong southwest winds, to the Yukon north coast. Usually bitterly cold weather over the southern interior is unaffected. It is under this pattern that the very cold Arctic air can plunge southward causing major cold spells to southern continental regions.

April: Through February and March the hours of daylight at northern latitudes increase and air temperatures moderate. Storm tracks shift northward and cyclogenesis is more frequent in the Peace region rather than in southern Alberta. By April there is less contrast between air masses so the intensity of storms diminishes. The Arctic high is now located over the Queen Elizabeth Islands with a ridge to the west of Hudson Bay. A broad southeasterly flow prevails at the surface over Yukon (Figure 7.2). Possibly the most important feature is the upper ridge which has settled over Yukon suppressing the amount of cloud and precipitation (Figure 12.3). Upper winds, in general, become lighter and more southwesterly.

July: Through May and June, the hours of daylight increase to a maximum and summer air masses prevail. The principal storm track, although weakened, is into the northern Gulf of Alaska with secondary tracks eastward across southern Yukon and through Alaska (Figure 12.1). The favoured area for cyclogenesis in the lee of the Cordillera shifts northward to the vicinity of Norman Wells. The surface pattern has a broad trough across Alaska, northern Yukon then southeast over Gt. Slave Lake (Figure 7.3). The upper ridge continues over Yukon but an upper trough is now defined over the Gulf, particularly in June. Although clouds and precipitation continue to be suppressed in the upper ridge, short-wave troughs do move through from the Gulf to bring cloud and showers. By July the upper trough over the Gulf is broader and the ridge over Yukon weaker (Figure 12.4), which enhances cloud and precipitation development. In summer the air holds its maximum water content so even though there is considerable sunshine, generally as much precipitation falls in the three summer months as falls in five winter months. The upper wind pattern is dominated by light westerlies.

October: From August through October the hours of darkness and cooling of the air masses escalate rapidly. The cooling at mid-latitudes, well south of Yukon, is less rapid, especially over oceans slow to lose their summer warmth. Thus the contrast between airmasses becomes greater and storms intensify. The upper trough over western Alaska becomes stronger (Figure 12.5), and the downstream upper ridge is situated over the eastern Yukon-Mackenzie Valley area causing southwest to west winds aloft over Yukon.

Mean surface pressure patterns indicate that a well-developed low with twin centres, one over the Aleutians and the other over the Gulf of Alaska dominates the northeastern Pacific. Over Yukon, a southeasterly flow prevails (Figure 7.4) as high pressure cells settle over the Beaufort Sea and to the west of Hudson Bay. A weak low pressure area persists near Ft. Simpson which is a reflection of the frequent cyclogenesis in the Ft. Nelson-Ft. Simpson region in fall. The secondary storm track that connects the Gulf-Ft. Nelson lows is not very evident on the mean MSL charts.

The major storm tracks generally shift southward in the fall, but the secondary track over the Bering Sea to the Beaufort is active (Figure 12.1). The weather systems can create significant cloud and precipitation especially in southeast Yukon, as the water content of the air masses is still fairly high. As fall progresses the Arctic break-off highs move southward through the Yukon-Mackenzie Valley region with increasing frequency. The secondary storm track shifts south over B.C. in November and December so there are less frequent intrusions of cloud and precipitation into Yukon. Significant air mass weather, such as low stratus and light precipitation near lakes and rivers is common until freeze-up, which is generally complete by mid-December.

12.3 Basic Synoptic Weather Patterns Over Yukon

The four most common weather patterns are depicted in Figures 12.6 to 12.9. They occur frequently enough to warrant discussion and identification of the associated weather.

Pattern A: Average Weather (Figure 12.6): This is the most frequent weather pattern affecting Yukon and occurs in all seasons. It consists of a high pressure area over B.C. with a persistent low in the western Gulf of Alaska. Individual storms move out of the central Pacific, turn northward along the coasts of B.C. and southeast Alaska, then amalgamate with the low in the western Gulf. Generally there will be a series of disturbances which have a recurrence of 24 to 48 hours while the overall pattern persists for a week or so.

Usually the first disturbance in the series gives the most cloud and precipitation. Over the Pacific an extensive shield of cloud begins 400 to 700km ahead of the low, thickening and lowering toward the centre. Precipitation develops within 200km of the low centre. The coastal slopes bear the brunt of these systems while the frontal structure weakens as it crosses the mountains. In summer, skies only partially clear behind the front and showers are fairly general over interior Yukon. In winter, skies usually clear after each disturbance although cloudy conditions with intermittent snow often persist along the southern and western slopes of the Cassiar-Pelly Mountains and in the Mackenzie-Ogilvie Mountains. Succeeding storms in the series generally have a less extensive cloud shield and lighter, less frequent precipitation.

Temperatures are near to slightly above seasonal values. Conditions are quite windy, particularly over southern Yukon.

Pattern B: Wet Unsettled Weather (Figure 12.7): This pattern is recognized as an extensive low pressure area over the northern Gulf of Alaska, Yukon, and Alaska. Pressure gradients around the low are not usually strong. It is somewhat similar to the "cold low" common to BC and Alberta. Once it develops it may persist for many days. Generally, to the dismay of residents, but to the benefit of an otherwise arid Yukon, widespread cloud and precipitation accompany this pattern. The organized cloud shields associated with the separate disturbances moving along the storm track usually remain south of Yukon while over the Territory, cloudy, showery, air mass weather never seems to end. The example in Figure 12.7 is early in a wet spell that prevailed from 11 July to 25 July, 1983.

In summer, the associated extensive clusters of instability cloud can cause heavy showers, especially in the afternoon, often developing into thunderstorms. Occasionally these will merge in the early evening to a solid layer of cloud giving continuous rain. In winter, the snowfalls can continue for prolonged periods with moderate accumulations. The associated cloud cover creates cool conditions in summer and relatively mild temperatures in winter. The key upper pattern is the large amplitude trough or closed low at the 50-kPa level.

Pattern C: Summer Hot Spells (Figure 12.8): This type of development requires a major high pressure area in position both at the surface and aloft over Alaska and western Yukon. Warm air associated with lows moving northward to the west of Alaska will move over Yukon, at least at high levels, but usually Yukon is far enough removed from the storm centres so that it receives little or no cloud. With primarily clear skies and only light northerly surface winds, Yukon is subject to strong solar heating. This pattern creates prolonged warm spells. It is frequently terminated by an Arctic low centre moving southward over Yukon. Cooling is abrupt behind the Arctic cold front, but precipitation is generally light.

The outstanding feature of the pattern in Figure 12.8 is the strong closed high at 50-kPa. This hot spell prevailed from 13 June to 19 June, 1969 with the peak on the 14th and 15th. Maximum temperatures ranged from 29.5°C to 35.6°C at several interior locations and from 18°C to 21°C on the north coast. The new townsite at Faro which was under construction at this time had half the buildings and much of the surrounding forest destroyed by a wildfire that came down a draw – a rather unusual track. When the townsite was rebuilt a local re-forestation program was also required. This June was one of the hottest and driest on record.

Pattern D: Winter Cold Spells (Figure 12.9): The surface and upper air pattern can be similar to Pattern C, except the cold spells last longer, as the surface high is much more intense. The pattern may be destroyed in the same manner as in summer, by a low centre developing over the Arctic Ocean and plunging southward over Yukon. Surprisingly, southwesterly winds which prevail ahead of the low bring the warmer air from the upper levels to the surface while the cloud and snow in and behind the system act as a protective blanket. The warm spell is usually realized in both Yukon and Alaska, but the Arctic high will inevitably rebuild southward to create another cold spell. The easterly winds to the south of the high will almost always end the warm spell in Alaska. In Yukon, however, above normal temperatures may continue if an intense storm develops in the Gulf of Alaska to create a strong southeasterly flow over the interior.

Note that in the example in Figure 12.9 there is a cold trough rather than a closed high at the 50-kPa level. This is not uncommon as strong surface highs can be associated with either type of 50-kPa pattern. The particular cold spell displayed in Figure 12.9 prevailed from 4 January to 12 January, 1975. Many communities experienced minimum temperatures less than -50°C and Ogilvie was the coldest with -60°C on 5 January.

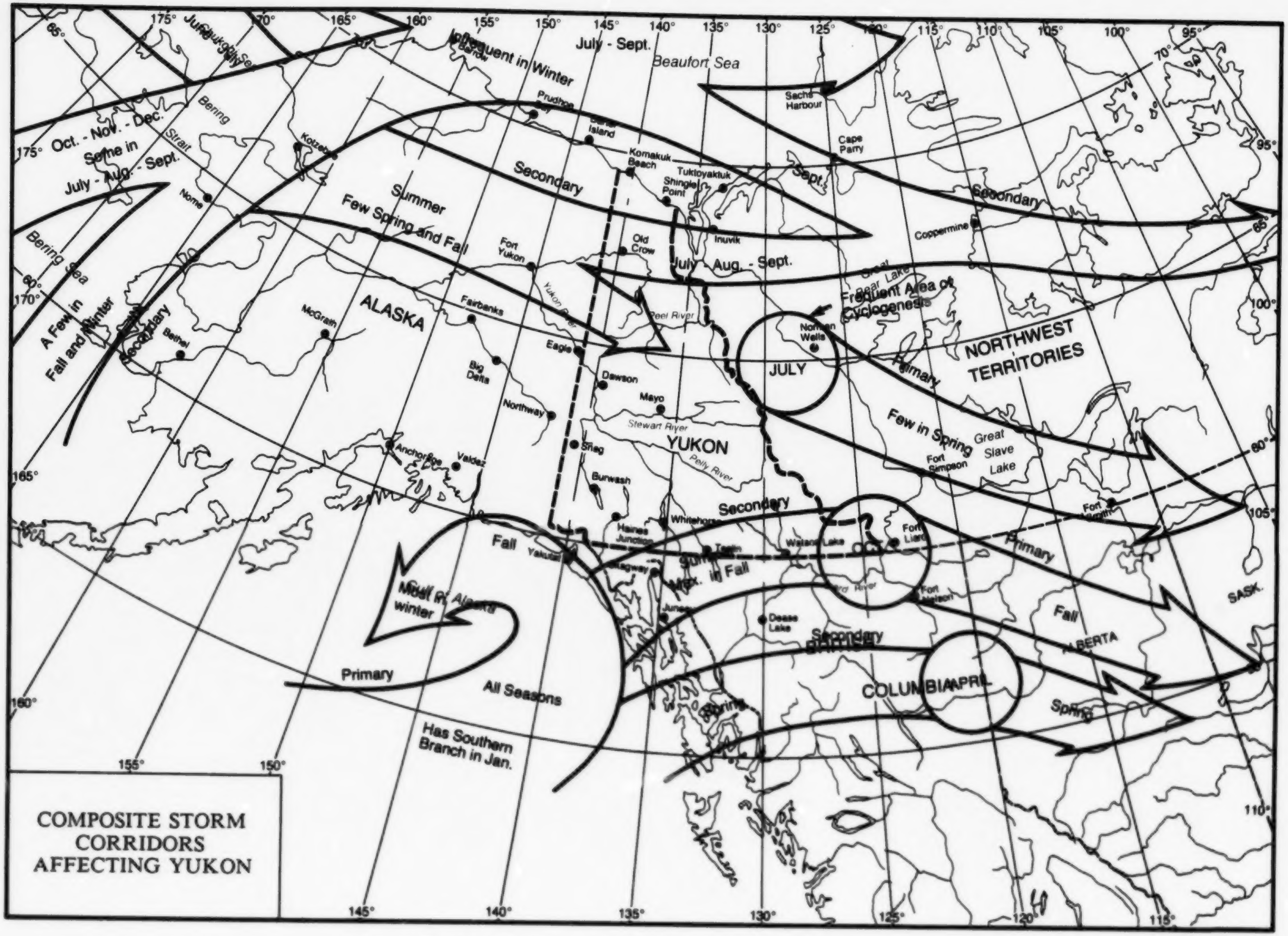

COMPOSITE STORM CORRIDORS AFFECTING YUKON
July - Sept.
Beaufort Sea
Infrequent in Winter
Oct. - Nov. - Dec.
Some in
July - Aug. - Sept.
Bering Strait
Bering Sea
A Few in
Fall and Winter
Secondary
Summer
Few Spring and Fall
Secondary
Sept.
Secondary
July - Aug. - Sept.
Frequent Area of Cyclogenesis
Great Bear Lake
JULY
Primary
NORTHWEST TERRITORIES
Few in Spring
Great Slave Lake
Secondary
OCT.
Primary
Summer
Max. in Fall
Fall
ALBERTA
SASK.
Secondary
BRITISH COLUMBIA
APRIL
Spring
Spring
Fall
Gulf of Alaska
Most in winter
Primary
All Seasons
Has Southern Branch in Jan.
ALASKA
YUKON
Barrow
Prudhoe Bay
Barter Island
Komakuk Beach
Shingle Point
Tuktoyaktuk
Inuvik
Sachs Harbour
Cape Parry
Coppermine
Kotzebue
Nome
Bethel
McGrath
Fort Yukon
Fairbanks
Big Delta
Northway
Eagle
Old Crow
Dawson
Mayo
Snag
Burwash
Haines Junction
Whitehorse
Teslin
Watson Lake
Dease Lake
Fort Liard
Fort Nelson
Fort Simpson
Fort Smith
Norman Wells
Anchorage
Valdez
Yakutat
Skagway
Juneau
Yukon River
Peel River
Stewart River
Pelly River
Liard River
175°
170°
165°
160°
155°
150°
145°
140°
135°
130°
125°
120°
115°
110°
105°
100°
95°
70°
65°
60°

Figure 12.1 Composite storm corridors affecting Yukon

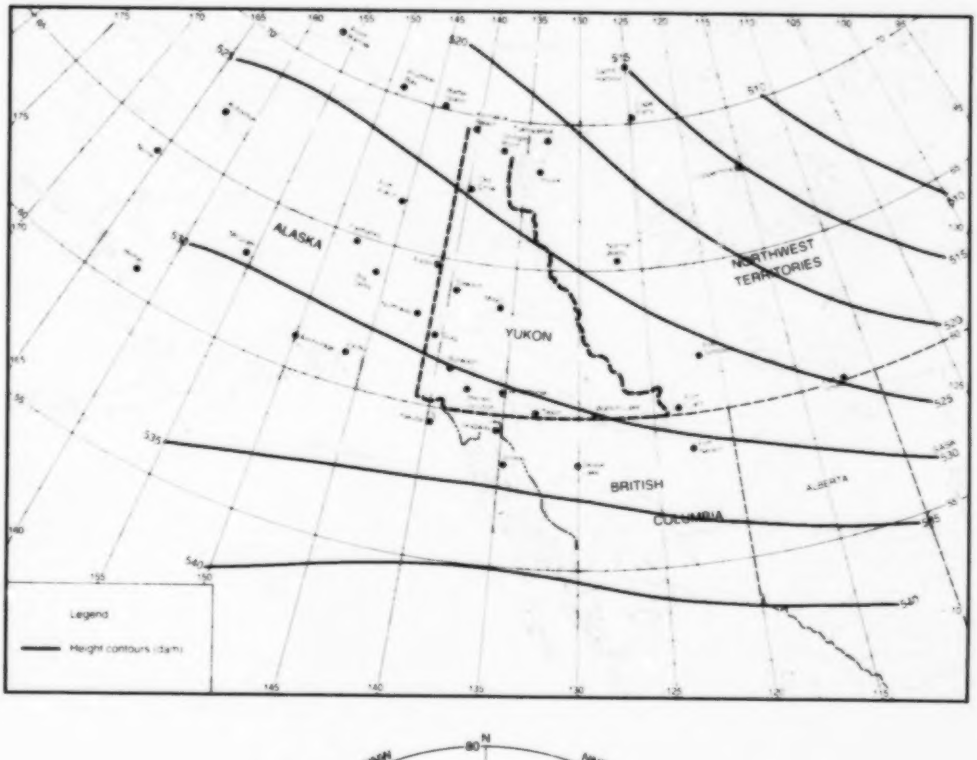

ALASKA
YUKON
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
510
515
520
525
530
535
540
Legend
Height contours (dam)
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
10
20
30
40
50
60
70
80
92.6
84.3
82.7
92.3
85 kPa
70 kPa
50 kPa
30 kPa
WHITEHORSE A

Figure 12.2 January mean 50-kPa altitude and mean monthly vector winds at standard levels in the atmosphere, for Whitehorse A

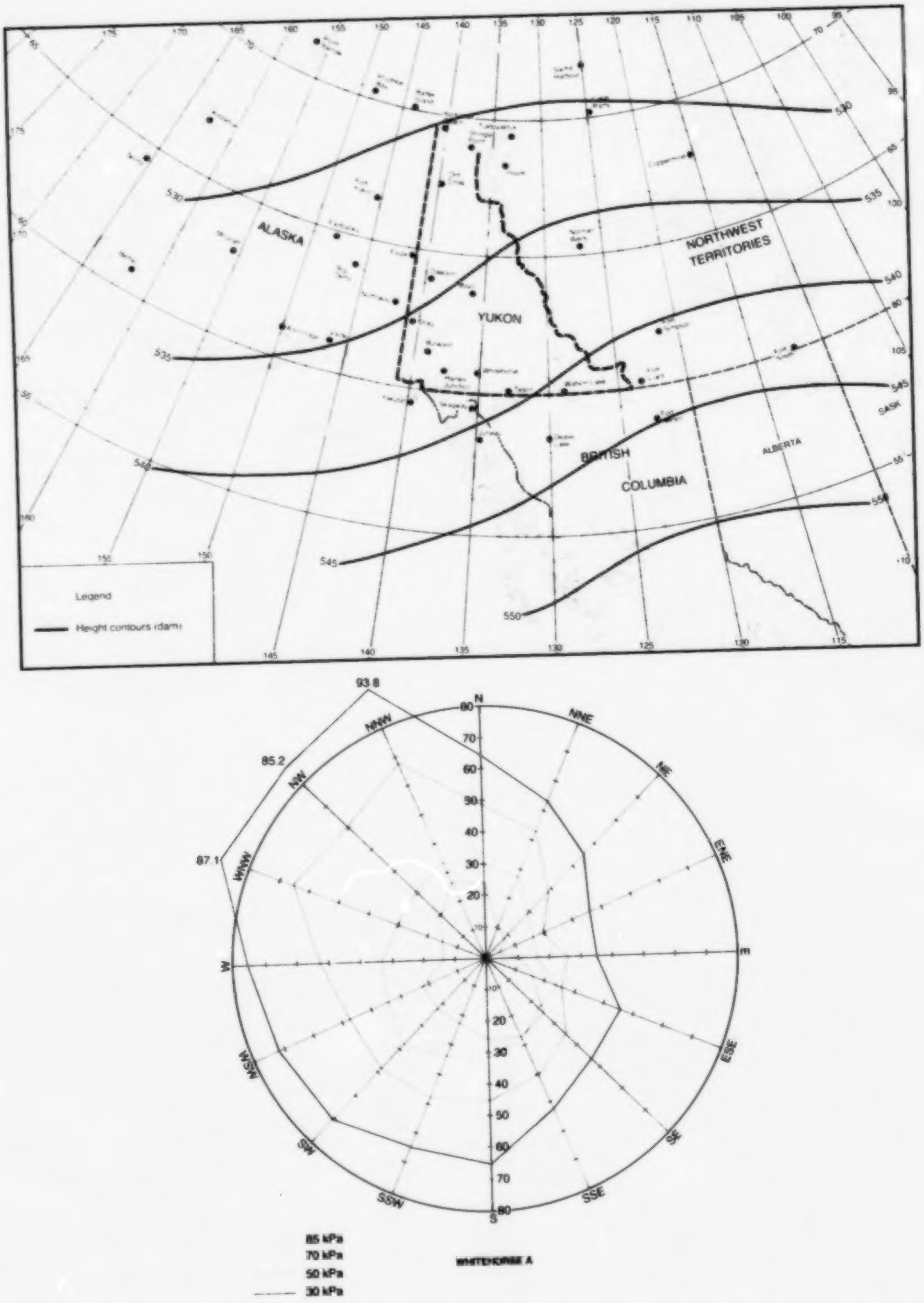

ALASKA
YUKON
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
SASK
530
535
540
545
550
Legend
Height contours (dam)
93.8
85.2
87.1
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
10
20
30
40
50
60
70
80
85 kPa
70 kPa
50 kPa
30 kPa
WHITEHORSE A

Figure 12.3 April mean 50-kPa altitude and mean monthly vector winds at standard levels in the atmosphere, for Whitehorse A

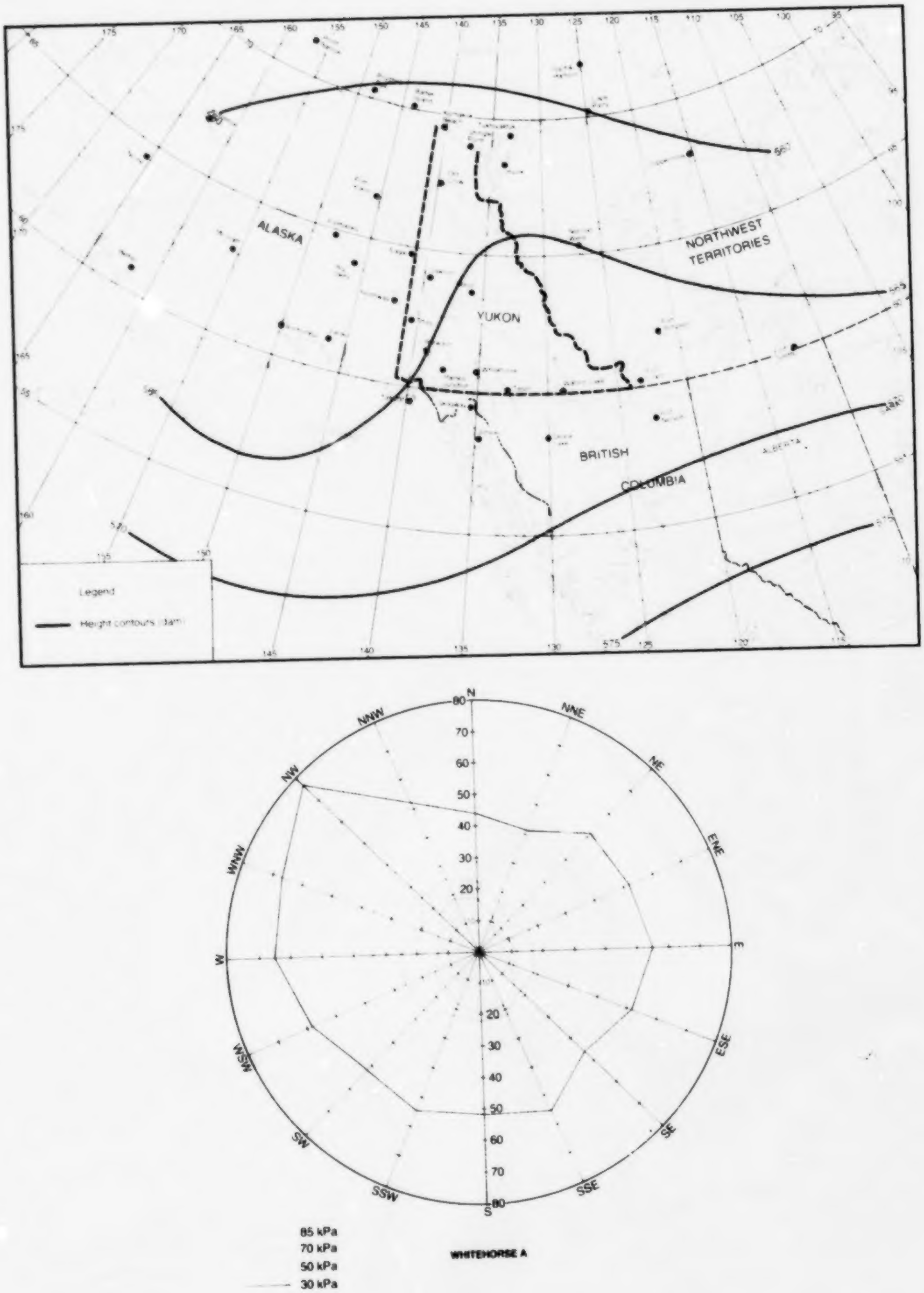

ALASKA
YUKON
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
560
565
570
575
Legend
Height contours (dam)
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
20
30
40
50
60
70
80
85 kPa
70 kPa
50 kPa
30 kPa
WHITEHORSE A

Figure 12.4 July mean 50-kPa altitude and mean monthly vector winds at standard levels in the atmosphere, for Whitehorse A

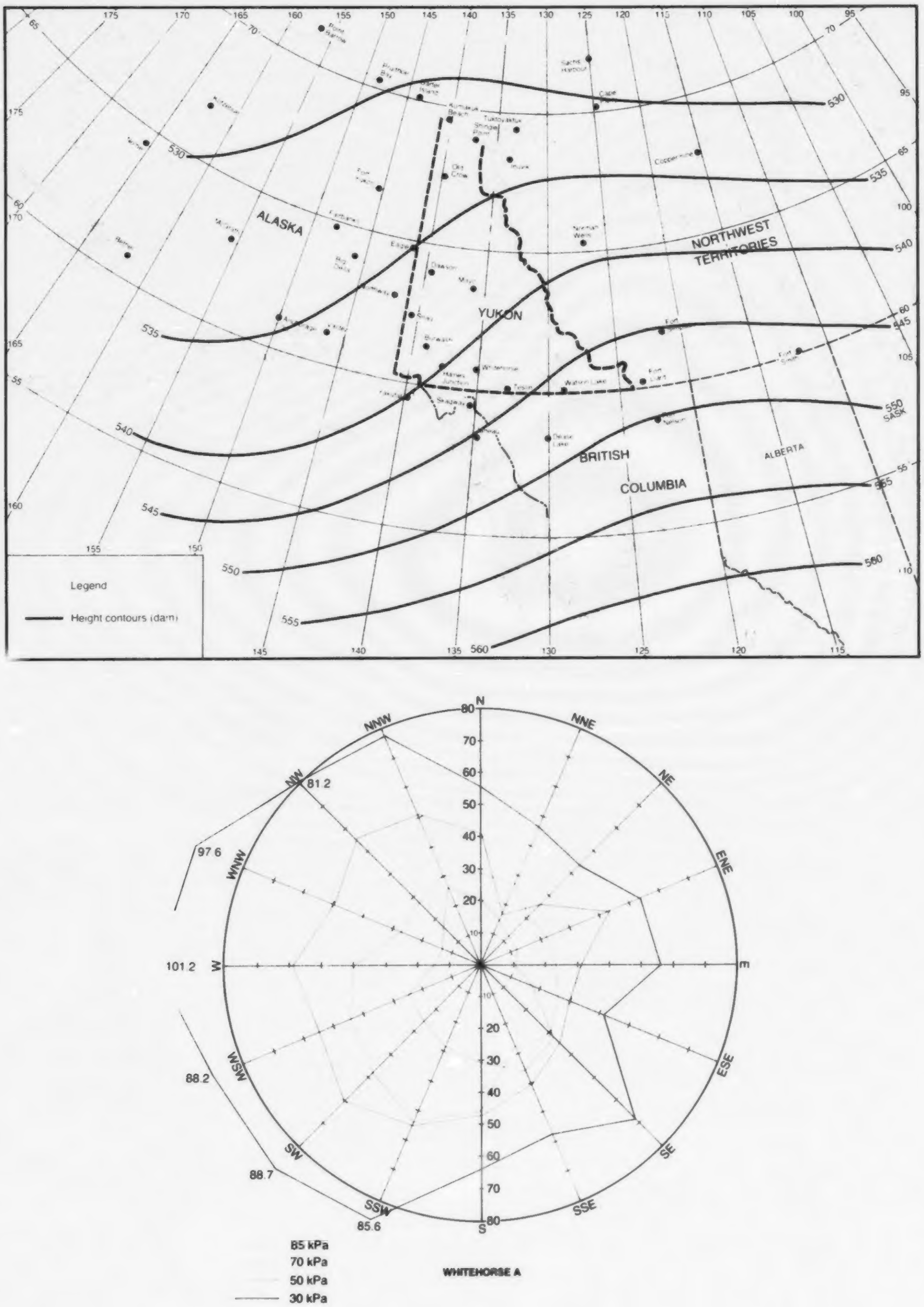

ALASKA
YUKON
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
SASK
530
535
540
545
550
555
560
Legend
Height contours (dam)
N
NNE
NE
ENE
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
81.2
97.6
101.2
88.2
88.7
85.6
85 kPa
70 kPa
50 kPa
30 kPa
WHITEHORSE A

Figure 12.5 October mean 50-kPa altitude and mean monthly vector winds at standard levels in the atmosphere, for Whitehorse A

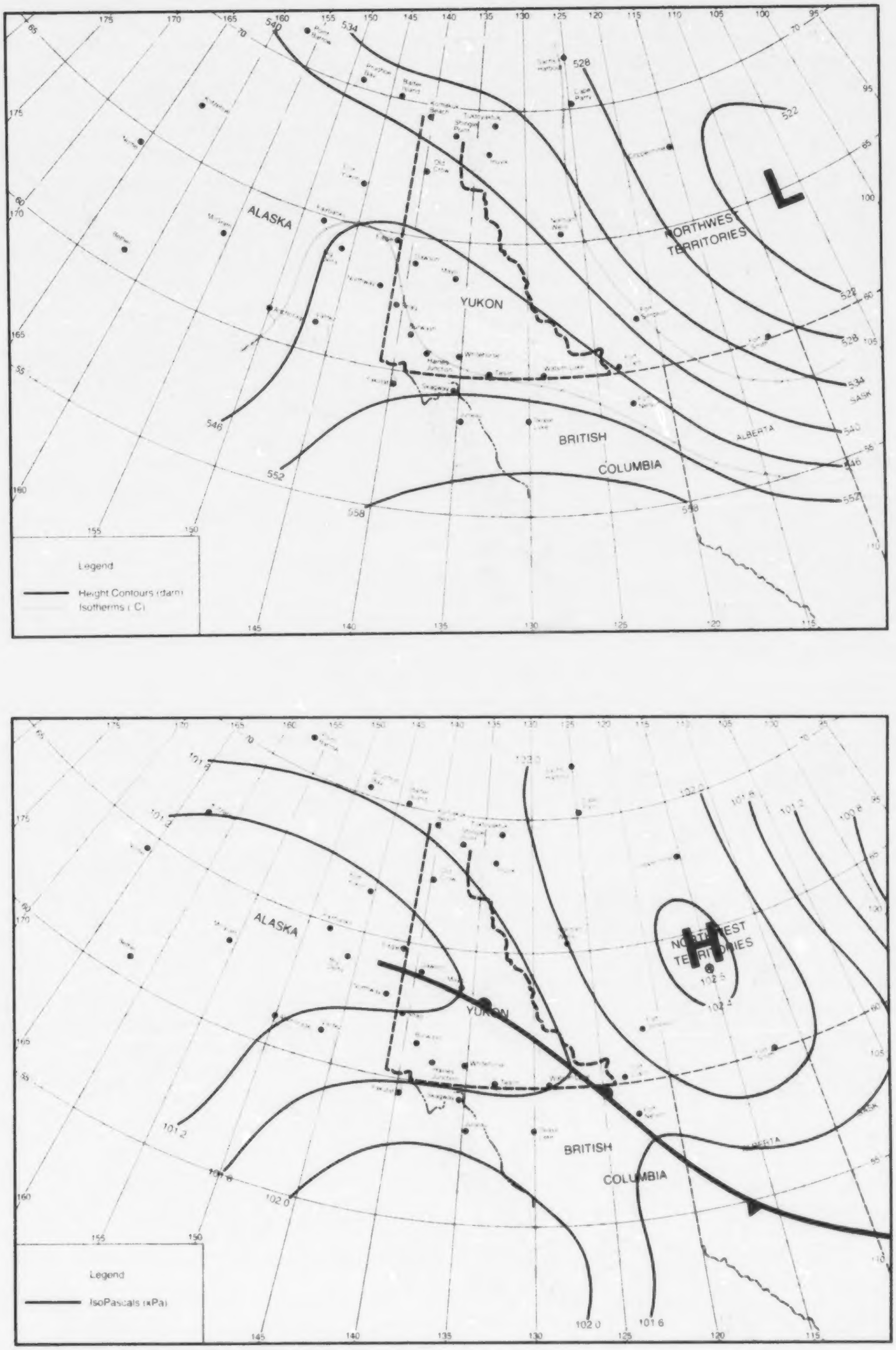

ALASKA
YUKON
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
SASK
L
522
528
534
540
546
552
558
Legend
Height Contours (dam)
Isotherms (C)
H
102.0
101.8
101.6
101.2
100.8
102.5
102.4
Legend
IsoPascals (kPa)

Figure 12.6 50-kPa (a) and MSL pressure (b) patterns for 0000 GMT, May 23, 1983 depicting common synoptic type A

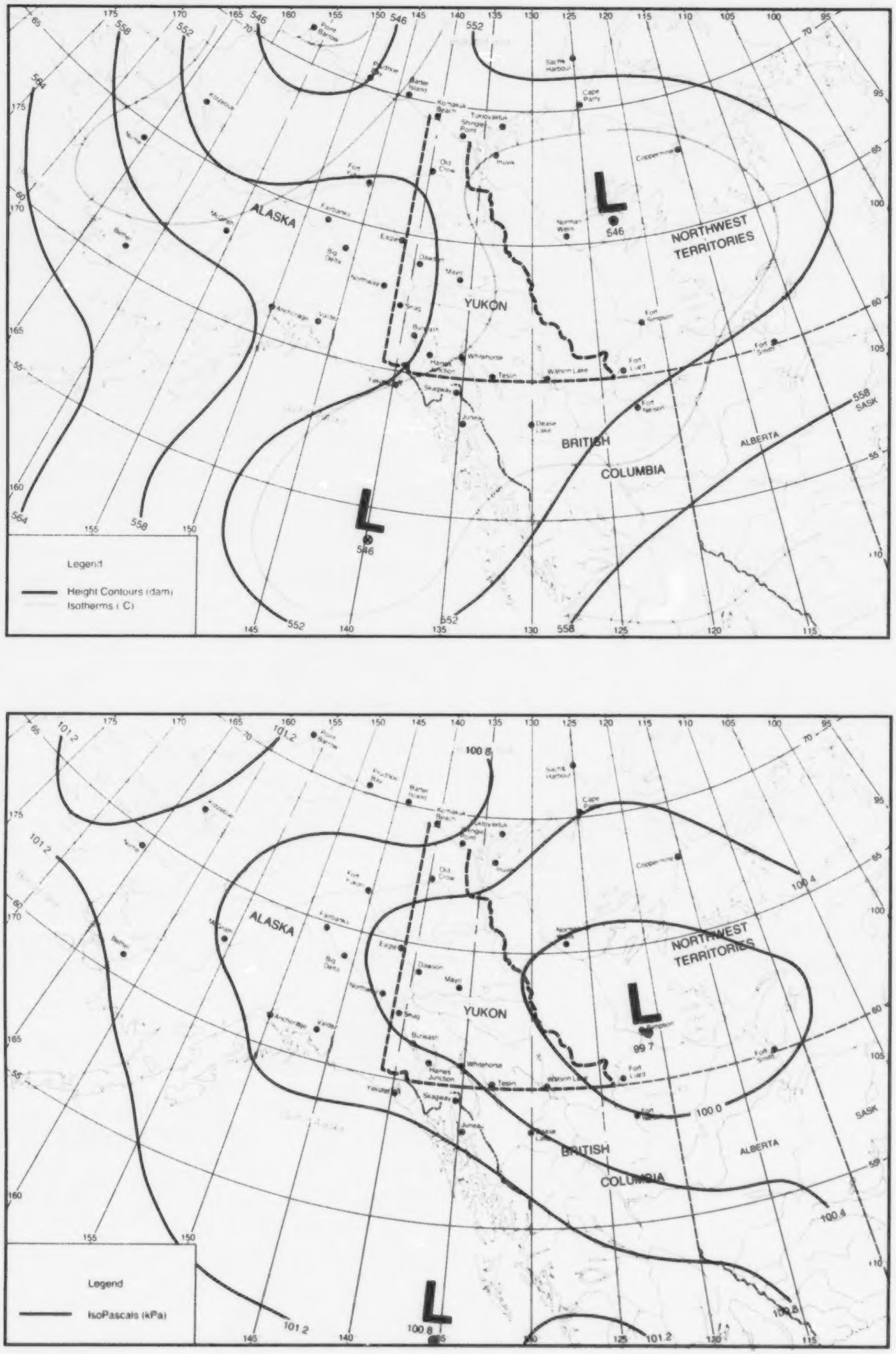

Legend
Height Contours (dam)
Isotherms (°C)
ALASKA
YUKON
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
SASK
L
546
552
558
564
Legend
IsoPascals (kPa)
101.2
100.8
100.4
100.0
99.7

Figure 12.7 50-kPa (a) and MSL pressure (b) patterns for 0000 GMT, July 13, 1983 depicting common synoptic type B

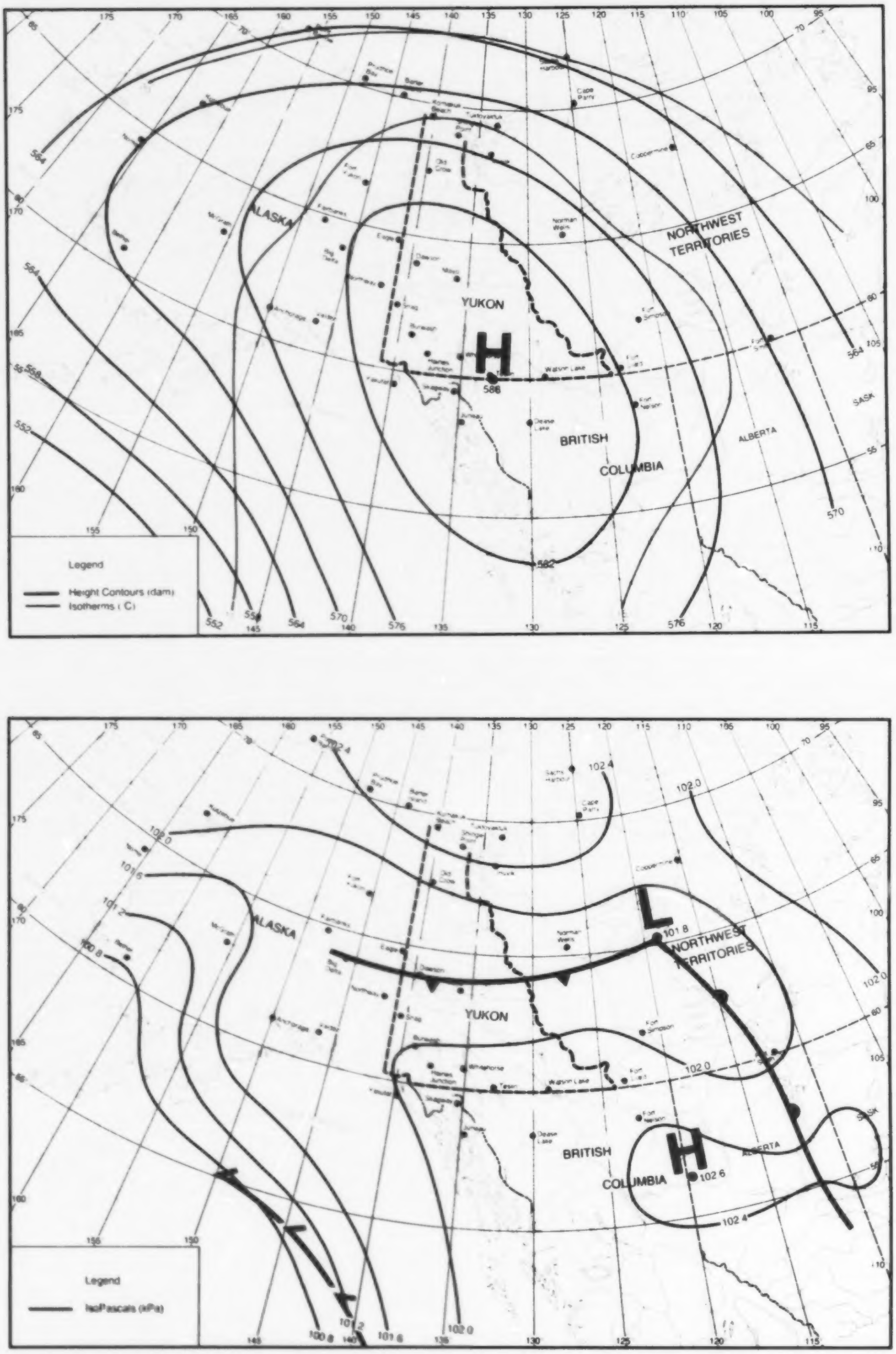

ALASKA
YUKON
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
SASK
H
588
582
576
570
564
558
552
Legend
Height Contours (dam)
Isotherms (C)
L
H
101.8
102.6
102.4
102.0
101.6
101.2
100.8
Legend
IsoPascals (kPa)

Figure 12.8 50-kPa (a) and MSL pressure (b) patterns for 0000 GMT, June 15, 1969 depicting common synoptic type C

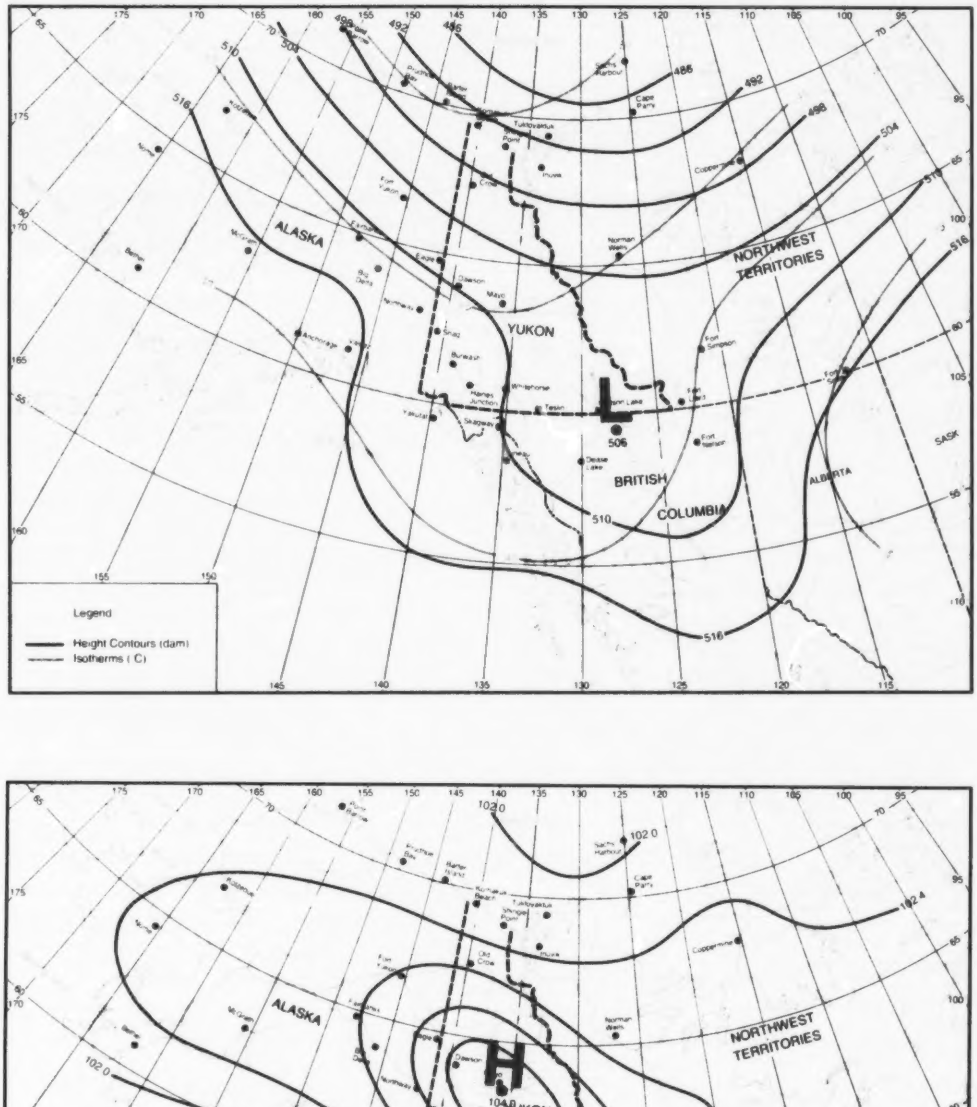

ALASKA
YUKON
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
SASK
L
H
486
492
498
504
510
516
506
102.0
102.4
103.2
103.6
102.8
104.0
101.6
Legend
Height Contours (dam)
Isotherms (°C)
IsoPascals (kPa)

Figure 12.9 50-kPa (a) and MSL pressure (b) patterns for 1200 GMT, January 9, 1975 depicting common synoptic type D

13. AIR POLLUTION POTENTIAL

Parameters that give an indication of air pollution potential are: surface-based inversion frequency, calm-to-light wind occurrence and ventilation coefficients. The frequency of occurrence of surface based inversions at Whitehorse and other northern stations, where twice-per-day upper-air data are available, is given in Table 13.1. At Whitehorse these inversions occur in the morning in all seasons ranging from 50% to 66% of the time. They are usually destroyed by solar heating and vertical mixing during the day particularly in spring and summer so that the occurrence in these seasons is only 1% or non-existent at 23 GMT.

As the occurrence of a surface-based inversion limits dispersion of pollutants, high air pollution potential could last all day or several days in winter. In other seasons a significant period of high pollution potential can exist in the morning but be replaced by good dispersion conditions by afternoon. Such inversion occurrence at Ft. Nelson is believed to be more representative of conditions in the Liard Basin than the Whitehorse data. Air pollution potential is expected to be somewhat higher in the eastern basin than in the Upper Yukon-Stikine Basin climatic region. There is a higher occurrence of inversions as well as a larger frequency of calm-to-light wind conditions in the Liard Basin compared to the Yukon-Stikine Basin.

The Yukon winter season has the maximum occurrence of calm wind conditions. At Dawson A, calm condition occurrence in the December to February period is 76% (Figure 7.8) yet at Whitehorse in this quarter winds are calm only 15.4% of the time (Figure 7.16). An examination of wind speed (section 7.2.3) indicates that the Central Yukon Basin climatic region has the least ventilation of any region in Yukon, particularly in winter. This basin has a high air pollution potential relative to other regions.

Two other very important meteorological parameters that determine the dilution of air pollutants are: the vertical height through which dispersion takes place (the mixing height), and the mean transport wind speed in the layer. The product of these two parameters can be interpreted as a ventilation or dilution factor (Holzworth, 1967) and is referred to as the "ventilation coefficient". Portelli (1977) calculated the mean afternoon mixing heights, wind speeds averaged through the mixed layer, and the ventilation coefficients for Canadian upper-air stations. Results for Whitehorse, Ft. Nelson and Inuvik are shown in Figure 13.1 to 13.3.

Mean ventilation coefficient values above 6000m^2/s indicate low air pollution potential (dashed line in Figure 13.1 to 13.3). Values at Whitehorse vary from a low of 870m^2/s in January to a peak of 11910m^2/s in May. Months with low air pollution potential are April to September inclusive. Ventilation coefficients generally decrease northward and eastward from Whitehorse (Portelli, 1977). At Ft. Nelson low air pollution potential occurs mainly from May to August (Figure 13.2) with generally lower ventilation coefficient values than at Whitehorse. At Inuvik July is the only month with low air pollution potential (Figure 13.3), but this is not likely representative of conditions on the Yukon north slope because winds there are higher than over the interior Mackenzie Delta.

TABLE 13.1

Frequency of Surface-Based Temperature Inversions (%)

STATION	DEC-FEB		MAR-MAY		JUN-AUG		SEP-NOV	
	23GMT	11GMT	23GMT	11GMT	23GMT	11GMT	23GMT	11GMT
Sachs Harbour	75	77	32	67	16	44	38	47
Inuvik A	58	67	3	60	0	61	25	46
Norman Wells A	49	59	13	65	5	69	22	49
Fort Smith A	28	47	4	58	3	71	10	50
Whitehorse A, Y.T.	42	60	1	54	0	66	9	50
Fort Nelson A	44	66	2	61	2	73	22	64
Coppermine	61	65	25	65	28	44	31	39

Source: Burns (1973).

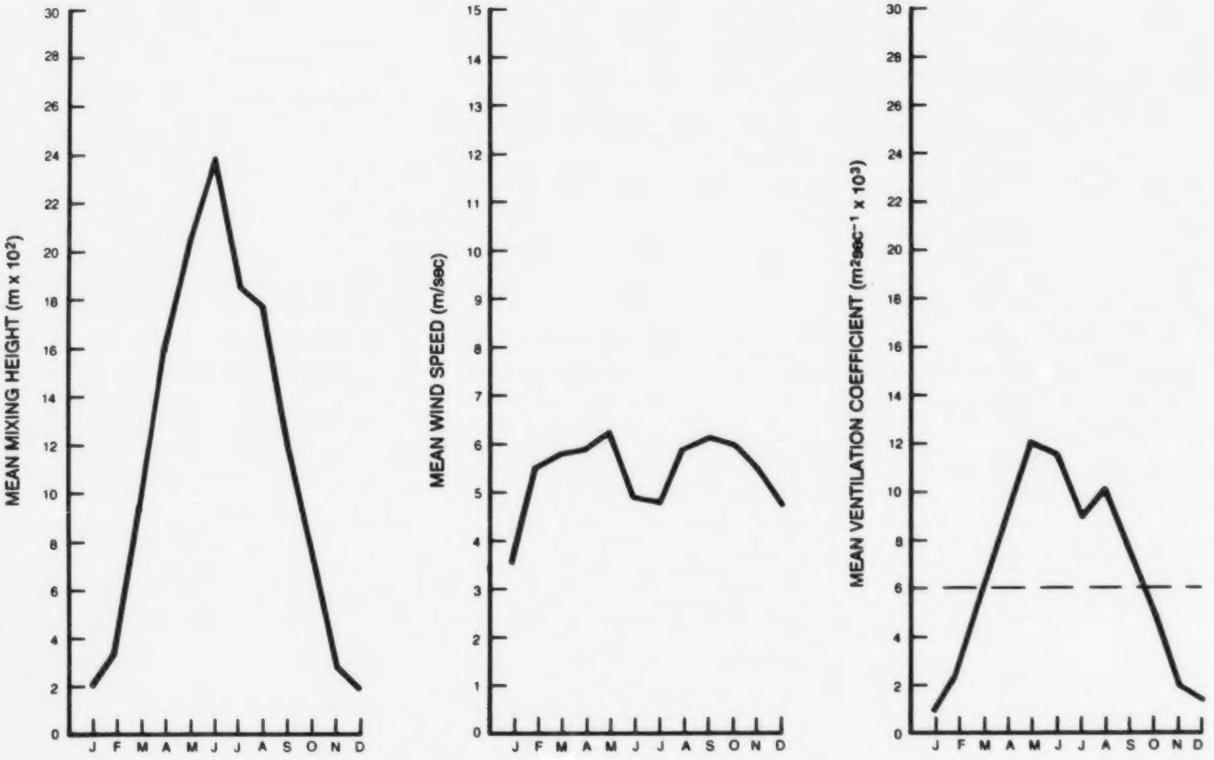


Figure 13.1 Monthly mean afternoon mixing heights, wind speeds averaged through the mixed layer and ventilation coefficients for Whitehorse A (Portelli, 1977)

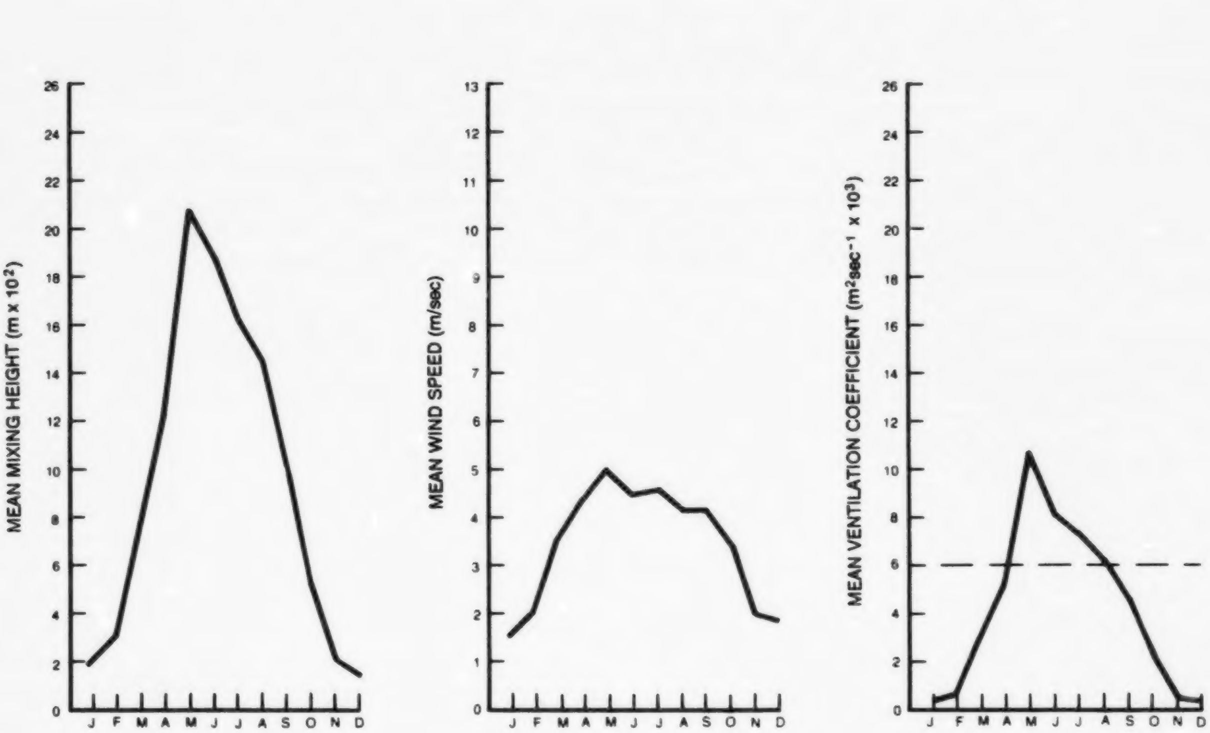


Figure 13.2 Monthly mean afternoon mixing heights, wind speeds averaged through the mixed layer and ventilation coefficients for Fort Nelson, B.C. (Portelli, 1977)

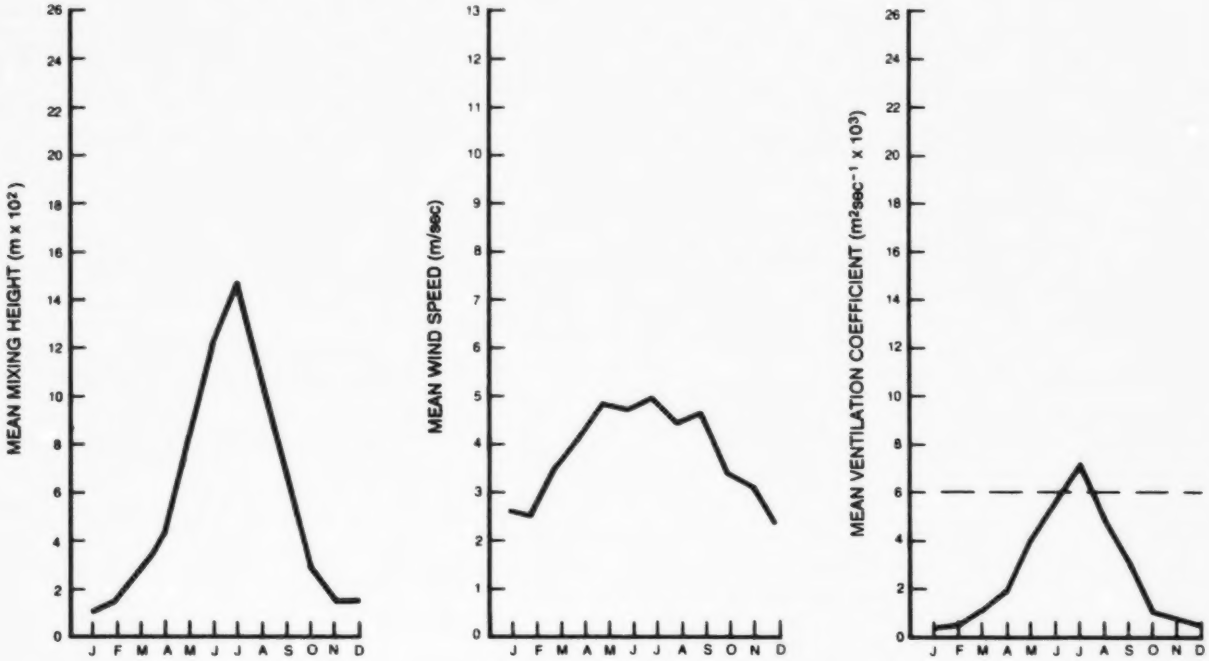


Figure 13.3 Monthly mean afternoon mixing heights, wind speeds averaged through the mixed layer and ventilation coefficients for Inuvik, N.W.T. (Portelli, 1977)

14. CLIMATIC CHANGE

There is currently considerable debate among theorists of climatic change on the future course of climatic events due to natural and in particular human activity impacts on world climate. There is no doubt that climate change has occurred in the past; there is an average global temperature difference of 5°C between full glacial and interglacial conditions. Warmer periods than today, roughly 8000 and 10000 BP, and the "little ice age" are well documented. Over the last 100 years there has been a slight warming trend, on which a still warmer oscillation was superimposed in the late 1930's and 1940's (Hengeveld, 1984).

In the northern hemisphere the warming trend in the first half of this century peaked in the 1940's. This warm period coincided with low volcanic activity which minimized the level of natural particulate pollution in the atmosphere (Bryson and Wendland, 1970). This early peak was well marked at Dawson; then the 10-year running mean dropped until the 1970's and has since started to recover. Present temperatures have not yet reached 1940 values (section 8.6).

Precipitation varies greatly from place-to-place and year-to-year and long-term trends are difficult to determine. At Mayo (Figure 9.47) 10-year running mean values dropped until the 1950's then a sharp recovery occurred in the 1960's. The trend at Whitehorse is similar but less pronounced than at Mayo (section 9.8), but there is considerable variability at other locations in Yukon. Hare and Thomas (1974) reported that there has been little significant change in decadal averages of precipitation over British Columbia in the last several decades. They also state that the recent cooling trend in Canada was accompanied by an increase in snowfall. In the winters of 1970-71 and 1971-72 new seasonal records were established at one-third of the 250 first-order weather reporting stations in Canada.

Zishka and Smith (1980) studied the climatology of cyclones and anticyclones over North America and surrounding oceans over the 28-year period 1950-1977. They found that the frequency of occurrence of both cyclones and anticyclones has decreased significantly over the 28 years. Also although the number of cyclones has decreased, the intensity on the average has increased (lower central pressure) whereas there has been no appreciable change in intensity for anticyclones. They conclude that the above results are real but do not postulate a reason for the observed changes.

There appears to be a general belief that the climate has become more "variable" in recent time. For instance, there is the suggestion that "since the 1940's and 1950's . . . the atmospheric circulation in the Northern Hemisphere appears to have shifted in a manner suggestive of an increasing amplitude of the planetary waves and of greater extremes of weather conditions in many areas of the world" (GARP, 1975). This appears in line with the findings of Zishka and Smith (1980) particularly the increase in intensity of cyclones. On the other hand, Boer and Higuchi (1979) investigated climate variability in the last 25 years via an analysis of variance of the 10-50 kPa thickness fields and found no support for the contention that the climate has become significantly more variable.

The debate over climatic change has been heated, confusing and full of uncertainties. However, a concensus among scientists is emerging which indicates that natural factors would lead us to expect a fairly narrow range of climate variation with present conditions near the warm end of the distribution. They believe that the effects of man's activities through the "greenhouse effect" could cause our climate to pass well beyond the warm extreme. By increasing the concentration of carbon dioxide, oxides of nitrogen, methane and chlorofluorocarbons in the upper atmosphere, the atmosphere/earth radiative balance is altered, resulting in higher temperatures in the lower atmosphere and a decrease of temperature in the upper atmosphere (Hengeveld, 1984).

The warming effect is expected to be 2-3 times greater in polar regions than the global average because of the reinforcing effect of melting ice and snow (Bruce, 1984). Such differential warming could alter global circulation patterns, including storm tracks and precipitation patterns. Potential impacts on Yukon will likely be mainly beneficial, but some could be detrimental. Some examples follow:

a) Fall and winter temperatures may rise as much as 10 to 12°C with summer temperatures showing more modest increases of 2-3°C. Space heating costs could decrease 15 to 20%.

b) Longer growing season would allow utilization of agricultural land presently non-productive due to climate constraints.

c) Snowfall season could be shorter but snow depth accumulations could be greater, creating larger runoff and making flooding more common.

d) The general warming in winter may result in less intense Arctic anticyclones which could then allow more frequent penetrations of Gulf of Alaska storms in winter, increasing snowfall and general storminess over the Yukon interior.

e) Slow permafrost decay will result in increased terrain instability and add to engineering design problems.

Researchers are confident that climatic change will create global warming and expect it to have a major impact on Canada within 50 years. They are uncertain, however, of the magnitude of such change, the extent of effects on a regional basis and how quickly the changes will occur.

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APPENDIX A

ABBREVIATIONS

A – Airport (after station name)
AES – Atmospheric Environment Service (Canada)
ASL – Above sea level
BC – British Columbia
BP – Before present
cm – centimetre(s)
C – Celsius
DEMR – Dept. of Energy, Mines and Resources (Canada)
DEW – Distant Early Warning
DOE – Dept. of the Environment (Canada)
ft – Feet
F – Fahrenheit
GMT(Z) – Greenwich Mean Time
h(hr) – Hour(s)
IHD – International Hydrological Decade
km – kilometre(s)
kPa – kiloPascal(s)
kt – knot
LST – Local Standard Time
m – metre(s)
min – Minute
MJm^{-2} – Megajoule per square metre
mm – millimetre(s)
mph – Miles per hour
MSL – Mean sea level
N – North (latitude)
NWT – Northwest Territories
sec – Second(s)
W – West (longitude)

~ – Approximately
> – Greater than
< – Less than
⩾ – Greater than or equal to
⩽ – Less than or equal to

APPENDIX B

DATA SUMMARIES FOR SHORT-TERM STATIONS NOT IN AES CLIMATE NORMALS

(Further information can be obtained from Yukon Weather Office, Room 205, Operations bldg., Whitehorse Airport, Whitehorse, Yukon, Y1A 3E4.)

DEZADEASH, YUKON Lat 60° 22 'N Long 137° 03'W Elev. 723 m

DESCRIPTION

The site is located at the junction of two fairly deep and narrow valleys which extend to the west and south. Dezadeash Lake lies immediately to the northeast in a broadening of these valleys in the other directions. The lake although fairly large, is fairly shallow, and does not appear to have major effects on the local climate. The area is subject to strong winds although not as strong as at Kathleen Lake which lies to the north. The station existed only from 1974-78 therefore this data should be used with caution.

1959-78 CALC.	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
TEMPERATURES													
Mean Daily Max. (°C)	-13.5	-7.0	-1.0	5.0	12.0	17.0	19.0	17.0	12.0	4.0	-6.0	-11.0	4.0
Mean Daily Min. (°C)	-24.0	-18.0	-14.0	-6.0	-1.0	3.0	6.0	4.0	1.0	-3.0	-15.0	-21.0	-7.3
Mean Daily (°C)	-18.8	-12.5	-7.5	-0.5	5.5	10.0	12.5	10.5	6.5	0.5	-10.5	-16.0	-1.7
Extreme Max. (°C)	5.0	6.1	7.0	17.8	22.8	25.6	28.9	30.0	23.3	11.1	8.3	3.3	30.0
Date/Year	25/77	18/77	8/78	28/76	11/75	6/78	31/76	14/77	1/74	6/76	13/76	25/75	
Number of Years of Record	5	4	4	4	4	4	4	5	5	5	5	5	
Extreme Min. (°C)	-45.6	-37.8	-32.2	-17.8	-6.7	-2.8	-1.1	-3.3	-11.7	-24.4	-30.5	-45.0	-45.6
Date/Year	10/75	4/75	4/78	8/76	9/77	7/75	26/75	30/76	29/74	31/75	25/77	8/77	
Number of Years of Record	5	4	4	4	4	4	4	5	5	5	5	5	
PRECIPITATION													
Mean Rainfall (mm)	1.0	0.5	0.5	0.5	13.0	40.0	40.0	30.0	50.0	20.0	5.0	1.0	201.0
Mean Snowfall (cm)	29.0	17.0	14.0	11.0	5.0	TR	NIL	TR	3.0	20.0	25.0	35.0	159.0
Mean Tot. Pcpn. (mm)	30.0	17.5	14.5	11.5	18.0	40.0	40.0	30.0	53.0	40.0	30.0	35.0	359.0
Number Days with Measurable Pcpn.	7	5	5	4	6	9	9	10	10	8	8	10	92
Mean Month End Depth of Snow on Ground (cm)	40	50	45	TR	NIL	NIL	NIL	NIL	NIL	2	20	35	

EAGLE PLAINS, YUKON Lat 66° 26'N Long 136° 45'W Elev. 716 m

DESCRIPTION

This site is located on the rolling uplands of Northern Yukon. Immediately to the east and north lies the Eagle River valley which is some 400 metres lower in elevation. 25km to the east lie the Richardson Mountains with elevations to 1200 m in this area.

Eagle Plains is typical of northern Yukon with winter-like conditions existing from mid-October to mid-May due to cold air entrapped in the Porcupine Basin north of the Ogilvie Mountains. It is also recognized that much lower temperatures occur in the winter in the valley floors that bisect this area.

Not known is the reason for, or the extent of, the heavier precipitation reported at Eagle Plains. Rock River, some 50km north, on the eastern slopes of the Richardson Mountains only received about one tenth of this precipitation.

1959-78 CALC.	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
TEMPERATURES													
Mean Daily Max. (°C)	-17.9	-19.5	-14.5	-3.5	6.5	15.8	18.3	15.5	6.8	-5.6	-12.7	-17.1	-2.3
Mean Daily Min. (°C)	-27.3	-27.2	-23.9	-14.8	-4.3	5.3	8.3	5.6	-1.0	-12.9	-19.8	-25.4	-11.5
Mean Daily (°C)	-22.6	-23.3	-19.2	-9.2	1.1	10.6	13.3	10.6	2.9	-9.3	-16.3	-21.3	-6.9
Extreme Max. (°C)	10.0	3.0	5.0	11.0	22.5	27.5	27.5	25.0	18.0	10.0	12.0	4.5	27.5
Date/Year	19/81	2/81	12/81	24/83	31/83	28/82	2/83	25/81	15/82	10/79	18/79	18/81	
Number of Years of Record	5	5	5	5	5	6	6	6	6	6	6	5	
Extreme Min. (°C)	-48.0	-40.0	-35.0	-30.0	-17.0	-6.0	-1.5	-5.5	-15.0	-30.0	-33.0	-39.0	-48.0
Date/Year	7/80	3/84	1/84	1/82	21/83	4/81	1/81	27/84	27/83	24/80	12/80	12/80	
Number of Years of Record	5	5	5	5	5	6	6	6	6	6	6	5	
PRECIPITATION													
Mean Rainfall (mm)	NIL	NIL	NIL	NIL	11.5	82.7	84.5	70.5	22.4	5.7	TR	NIL	277.3
Mean Snowfall (cm)	19.7	19.3	14.5	20.3	3.7	1.0	0.5	1.5	14.7	25.6	25.5	18.1	164.6
Mean Tot. Pcpn. (mm)	19.7	19.3	14.5	20.3	15.4	83.7	85.0	72.0	37.1	31.3	25.5	18.1	441.9
Number Days with Measurable Pcpn.	7	5	7	7	6	11	14	14	12	8	8	6	105
Mean Month End Depth of Snow on Ground (cm)	57	63	59	MISG	NIL	NIL	NIL	NIL	MISG	MISG	MISG	MISG	

FRANCIS LAKE, YUKON Lat 61° 17′N Long 129° 24′W Elev. 739 m

DESCRIPTION	This Hudson's Bay post was located on the east arm of Francis Lake, some 130 km north of Watson Lake, and 30 km north of Tuchitua. There is a steady increase in precipitation northward from Watson Lake to Tuchitua with the increase in elevation. There is a decrease in precipitation again to the north towards Francis Lake and northwest to Finlayson Lake. This decrease is due to a rain shadow effect of the Pelly-St. Cyr Mountains to the southwest.

1959-78 CALC.	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
TEMPERATURES													
Mean Daily Max. (°C)	-20.9	-11.6	-4.3	5.5	12.9	18.8	20.3	18.5	13.5	3.2	-11.5	-16.8	2.3
Mean Daily Min. (°C)	-30.6	-22.7	-19.8	-9.0	-2.1	3.2	6.1	5.4	1.9	-4.7	-18.5	-25.5	-9.7
Mean Daily (°C)	-25.8	-17.2	-12.1	-1.8	5.4	11.0	13.2	12.0	7.7	-0.8	-15.0	-21.2	-3.7
Extreme Max. (°C)	6.1	6.1	13.9	13.9	30.0	28.9	30.0	28.3	24.4	15.0	6.7	3.3	30.0
Date/Year	10/49	27/49	17/47	29/43	29/48	16/44	21/47	2/42	9/46	10/44	12/46	13/44	
Number of Years of Record	8	8	7	7	7	6	5	6	7	7	7	7	
Extreme Min. (°C)	-60.0	-58.9	-38.3	-33.9	-11.1	-2.2	0.6	-4.4	-9.4	-13.3	-38.9	-49.4	-60.0
Date/Year	29/47	1/47	2/48	6/45	7/45	15/47	13/47	19/47	27/46	27/46	15/45	13/46	
Number of Years of Record	7	7	7	7	7	6	5	6	6	6	6	6	
PRECIPITATION													
Mean Rainfall (mm)	TR	NIL	NIL	2.0	24.8	49.5	48.2	33.0	44.5	27.2	1.0	TR	230.2
Mean Snowfall (cm)	35.3	24.9	26.5	24.5	2.0	NIL	NIL	NIL	1.0	13.0	29.5	31.0	187.7
Mean Tot. Pcpn. (mm)	35.3	24.9	26.5	26.5	26.8	49.5	48.2	33.0	45.5	40.2	30.5	31.0	417.9
Number Days with Measurable Pcpn.	15	11	10	7	6	11	14	11	12	10	14	14	135
Mean Month End Depth of Snow on Ground (cm)	Missing due to lack of data												
Max. Tot. Pcpn. (mm)	56.4	43.4	34.3	30.5	29.7	79.0	72.9	48.3	54.4	53.8	63.5	73.4	
Year	48	44	48	42	49	45	45	43	48	44	44	43	
Min. Tot Pcpn. (mm)	24.6	14.5	3.0	7.1	2.3	31.0	26.9	10.7	24.4	6.6	21.6	25.1	
Year	45	47	49	48	48	46	47	45	47	47	47	44	

OGILVIE RIVER, YUKON Lat 65° 12′N Long 138° 18′W Elev. 579 m

DESCRIPTION:	This maintenance camp lies in the valley of the Ogilvie River, along the north edge of the Ogilvie Mountains. The valley at this site is very constricted with surrounding mountains of 1300 to 1600 m but broader to the west and northeast. The low elevation itself results in quite marked radiational cooling and heating.

1959-78 CALC.	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
TEMPERATURES													
Mean Daily Max. (°C)	-25.3	-20.8	-13.7	-0.1	9.3	17.8	19.9	17.1	9.1	-4.4	-16.5	-24.0	-2.6
Mean Daily Min. (°C)	-36.1	-33.5	-31.4	-17.9	-3.8	4.0	6.0	2.5	-3.2	-15.5	-27.0	-33.8	-15.8
Mean Daily (°C)	-30.7	-27.2	-26.6	-9.0	2.8	10.9	13.0	9.8	3.0	-10.0	-21.8	-28.9	-9.7
Extreme Max. (°C)	9.0	4.0	6.0	13.0	26.0	28.0	31.7	29.0	25.6	14.0	7.2	5.0	31.7
Date/Year	16/81	5/81	12/81	26/81	31/83	27/83	11/75	1/78	1/74	10/79	28/76	1/76	
Number of Years of Record	10	9	9	11	11	11	11	12	12	11	9	8	
Extreme Min. (°C)	-60.0	-55.0	-52.8	-40.0	-15.0	-5.0	-1.1	-10.0	-25.0	-42.0	-50.6	-52.8	-60.0
Date/Year	5/75	13/75	10/74	2/74	3/82	11/79	2/74	19/83	28/83	29/84	19/74	20/74	
Number of Years of Record	10	9	9	11	11	11	11	12	12	11	9	8	
PRECIPITATION													
Mean Rainfall (mm)	NIL	NIL	NIL	NIL	13.0	52.0	65.9	45.3	27.3	7.5	NIL	NIL	205.0
Mean Snowfall (cm)	19.5	15.8	10.7	16.3	4.6	TR	NIL	1.5	8.1	28.3	16.6	15.2	136.6
Mean Tot. Pcpn. (mm)	19.5	15.8	10.7	16.3	17.6	52.0	65.9	46.0	35.4	29.8	16.6	15.2	341.6
Number Days with Measurable Pcpn.	7	6	5	6	6	12	15	12	9	9	7	7	101
Mean Month End Depth of Snow on Ground (cm)	50	57	61	MISG	NIL	NIL	NIL	NIL	TR	MISG	MISG	MISG	

PARKIN, YUKON Lat 66° 14'N Long 137° 17' Elev. 533 m

DESCRIPTION	
	Parkin was a short term oil exploration camp located in the foothill country between the Ogilvie and Richardson Mountains. The site itself was located on the crest of one of these foothill ridges. Although the data were limited, close comparisons were made with similar time periods in Old Crow and Dawson to allow a utilization of the data in this data sparse area. Heavier precipitation occurred than expected; however, this may be due to orographic lift on the Ogilvies. The higher winter temperatures reflect the strong inversion characteristics in the northern Yukon.

1959-78 CALC.	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
TEMPERATURES													
Mean Daily Max. (°C)	-21.3	-17.8	-14.6	-0.9	9.0	17.1	18.9	17.0	8.0	-2.3	-16.2	-19.4	-1.9
Mean Daily Min. (°C)	-30.4	-27.3	-23.6	-11.5	-1.0	6.7	8.7	8.0	-1.5	-9.7	-23.0	-27.2	-10.9
Mean Daily (°C)	-25.9	-22.6	-19.1	-6.2	4.0	11.9	13.8	12.5	3.3	-6.0	-19.6	-23.3	-6.4
Extreme Max. (°C)	0.0	-3.3	4.4	10.0	17.8	26.7	32.2	25.6	21.1	6.7	-11.1	-2.2	-32.2
Date/Year	9/73	21/73	30/73	30/73	26/73	17/72	12/72	2/73	17/73	17/72	2/72	9/72	
Number of Years of Record	2	3	3	2	2	3	4	3	2	1	2	2	
Extreme Min. (°C)	-47.8	-47.2	-37.8	-26.1	-12.8	-2.2	-2.2	-5.0	-12.2	-27.8	-30.0	-48.9	-48.9
Date/Year	16/73	12/74	8/74	6/72	11/72	4/74	1/74	21/74	22/72	22/72	16/71	13/71	
Number of Years of Record	2	3	3	2	2	3	3	4	2	2	2	2	
PRECIPITATION													
Mean Rainfall (mm)	NIL	NIL	NIL	NIL	7.0	57.0	55.0	70.0	29.0	NIL	NIL	NIL	218.0
Mean Snowfall (cm)	18.0	17.5	12.5	20.0	38.0	3.0	NIL	5.0	20.0	45.0	46.0	30.0	255.0
Mean Tot. Pcpn. (mm)	18.0	17.5	12.5	20.0	45.0	60.0	55.0	75.0	49.0	45.0	46.0	30.0	473.0
Number Days with Measurable Pcpn.	8	6	6	7	8	12	11	12	11	10	12	12	115
Mean Month End Depth of Snow on Ground (cm)	Missing due lack of observations												
Max. Tot. Pcpn. (mm)	41.4	36.1	9.1	45.7	72.6	95.3	57.9	184.7	84.6	MISG	65.0	49.8	
Year	73	73	72	73	72	72	74	73	72		72	72	
Min. Tot. Pcpn. (mm)	4.6	TR	3.3	39.1	13.7	65.0	41.7	39.6	13.2	MISG	27.2	21.6	
Year	72	74	73	72	73	73	72	72	73		71	71	

APPENDIX C

YUKON TERRITORY SNOW COURSES – 1984

NAME	NUMBER SNOW COURSE	ELEVATION (METRES)	LATITUDE	LONGITUDE	MEASURED BY**
Alsek River Basin					
Canyon Lake	08AA-SC1	1160	61°07′	136°59′	6
Dezadeash	08AA-SC2	725	60°22′	137°04′	8
Felsite Creek	08AB-SC1	762	60°34′	138°05′	8
Bates River	08AB-SC2	686	60°09′	137°56′	8
Summitt	08AB-SC3	985	60°52′	137°38′	1
Stanley Creek	08AC-SC1	925	59°56′	136°48′	5
Takhanne	08AC-SC2	762	60°07′	136°59′	1
Liard River Basin					
Watson Lake Airport	10AA-SC1	685	60°07′	128°50′	7
Mud Lake*	10AA-SC2	1067	61°06′	131°15′	1
Pine Lake Airstrip	10AA-SC3	995	60°06′	130°56′	1
Frances River	10AB-SC1	730	60°35′	129°11′	1
Hyland River	10AD-SC1	855	61°31′	128°16′	1
Tungsten	10EA-SC1	1175	61°57′	128°15′	1
*Previously called Ings River					
Porcupine River Basin					
Old Crow	09FC-SC1	255	60°34′	139°51′	1
Eagle Plains	09FC-SC2	716	66°25′	136°45′	1
Eagle River	09FC-SC3	335	66°47′	136°43′	1
Peel River Basin					
Blackstone River	10MA-SC1	1020	64°57′	138°16′	1
Ogilvie River	10MA-SC2	550	65°22′	138°18′	1
McKenzie River Basin					
Tsichu River	10HA-SC1	1564	63°18′	129°49′	1

YUKON TERRITORY SNOW COURSES – 1984

NAME	NUMBER SNOW COURSE	ELEVATION (METRES)	LATITUDE	LONGITUDE	MEASURED BY**
Yukon River Basin					
Tagish	09AA-SC1	1080	60°17′	134°11′	1
Montana Mountain	09AA-SC2	1020	60°08′	134°44′	1
Log Cabin	09AA-SC3	880	59°46′	134°58′	3
Atlin	09AA-SC4	730	59°34′	133°42′	3
Mt. McIntyre A	09AB-SC1A	915	60°40′	135°07′	1
Mt. McIntyre B	09AB-SC1B	1130	60°40′	135°08′	1
Mt. McIntyre C	09AB-SC1C	1205	60°39′	135°09′	1
Mt. McIntyre D	09AB-SC1D	1355	60°38′	135°09′	1
Whitehorse Airport	09AB-SC2	700	60°42′	135°04′	2
McClintock	09AB-SC3	685	60°36′	134°26′	1
Chadburn Lake	09AB-SC4	710	60°39′	134°58′	1
Long Lake	09AB-SC5	671	60°45′	135°02′	1
Meadow Creek	09AD-SC1	1235	60°35′	133°05′	1
Mt. Berdoe	09AH-SC1	1035	62°02′	136°14′	1
Ross River Hill	09BA-SC1	975	61°56′	132°28′	1
Twin Creeks	09BA-SC2	900	62°40′	131°07′	1
Hoole River	09BA-SC3	1085	61°28′	131°28′	1
Rose Creek (Faro)	09BC-SC1	1080	62°20′	133°23′	9
Victoria Creek	09CA-SC1	990	62°01′	137°04′	1
Aishihik Lake Upper	09CA-SC2	1160	61°43′	137°20′	1
Burwash Airstrip	09CA-SC3	810	61°23′	139°03′	1
Duke River	09CA-SC4	1465	61°07′	138°53′	8
Beaver Creek	09CB-SC1	655	62°25′	140°51′	1
Casino Creek	09CD-SC1	1065	62°44′	138°48′	1
Fort Selkirk	09CD-SC2	454	62°49′	137°22′	1
Rogue River	09DA-SC1	762	63°31′	132°05′	1
Stewart Crossing	09DD-SC3	610	63°22′	136°41′	1
King Solomon Dome	09EA-SC1	1080	63°53′	138°56′	1
Grizzly Creek	09EA-SC2	1220	64°26′	138°17′	1
Midnight Dome	09EB-SC1	855	64°04′	139°24′	1
Eagle Village	09EC-SC1	275	64°48′	141°08′	4
Boundary	09EC-SC2	1005	64°05′	141°27′	4
Clinton Creek	09EC-SC4	335	64°24′	140°37′	1

**Numbers refer to Agencies cooperating in the Yukon Snow Surveys.

1. Department of Indian and Northern Affairs
2. Environment Canada – Atmospheric Environment Service
3. British Columbia Water Investigation Branch
4. Alaska Soil Conservation Service
5. Yukon Territorial Government
6. Northern Canada Power Commission
7. Transport Canada
8. Parks Canada
9. Cyprus Anvil Mining Corporation

Long Duration Recording Precipitation Gauge Stations

YUKON AND NORTHWEST TERRITORIES

STATION	LAT.	LONG.	ELEV. (metres)	FIRST REPORT	GAUGE (TYPE)
Baker Creek	62 30	114 22	182	8 1969	FP-15
Beaver River	60 8	124 53	518	11 1977	FP-15
Canada Tungsten	62 1	128 23	455	10 1973	FP-15
Dempster 164	65 47	137 47	853	11 1977	FP-15
Dezadeash	60 22	137 3	724	11 1980	FP-15
Fort Reliance	62 43	109 10	168	9 1980	FP-15
Frances River	60 35	129 11	732	10 1973	FP-15
Hyland River Strip	61 30	128 16	853	10 1973	FP-15
Meadow Creek	60 35	133 5	1235	11 1981	FP-15
Montana Mountain	60 5	134 40	1752	6 1978	FP-15
Mush Lake Upper	60 8	137 26	1676	11 1977	FP-15
Nahanni Hot Springs	61 15	124 2	610	8 1973	FP-15
Resolute	74 43	94 59	67	8 1980	FP-15
Rock River	66 47	136 20	610	9 1974	FP-15
Sheep Creek Upper	61 1	138 37	1585	7 1975	FP-15
Sheldon Lake	62 37	131 17	884	11 1977	FP-15
Virginia Falls	61 38	125 48	610	8 1973	FP-15
Wahls Revenge	63 23	131 34	1554	8 1976	FP-15

F & P-15 – Fisher & Porter with 15 minute timer.

APPENDIX D

CLIMATE PUBLICATIONS

Canadian Climate Normals, 1951 – 1980

Volume	Title	Issued	Price
1	Radiation	1982	$ 3.00
2	Temperature	1982	$ 6.00
3	Precipitation	1982	$ 8.00
4	Degree Days	1982	$ 6.00
5	Wind	1982	$ 5.00
6	Frost	1982	$ 3.00
7	Bright Sunshine	1982	$ 3.00
8	Pressure, Temperature and Humidity	1984	$ 7.00
9	Soil Temperature, Lake Evaporation, Days With . . .	1984	$ 5.00

Other AES Climatological Publications Relative to Yukon

Principal Station Data PSD-77 For Dawson	$ 2.95
Principal Station Data PSD-77 for Whitehorse (A summary of hourly weather observations, climate normals and extremes)	$ 2.95

To Order Climate Publications

Each year the Atmospheric Environment Service publishes climate data and information in a number of current or historical periodicals. Most of the publications are available on subscription. Many one-time publications containing specialized information on statistical summary sheets, in normals booklets, in bibliographies and in atlases are issued on occasion. Information about the contents and format of these publications and how copies may be obtained is available from the Atmospheric Environment Service upon request.

Generally, the front-line supplier of climate information is the regional climatological specialist or his equivalent. For items of an inter-regional, national or international nature, the enquirer should contact the Canadian Climate Centre. The name and address of the office from which subscriptions or copies of publications may be obtained are shown below.

Regional Offices:

Director, Pacific Region
Atmospheric Environment Service
700-1200W., 73rd Avenue
Vancouver, B.C. V6P 6H9
Attn: Scientific Services

Director, Western Region
Atmospheric Environment Service
Argyll Centre
6325 – 103 Street
Edmonton, Alberta T6H 5H6
Attn: Scientific Services

Director, Central Region
Atmospheric Environment Service
Room 1000
266 Graham Avenue
Winnipeg, Manitoba R3C 3V4
Attn: Scientific Services

Director, Ontario Region
Atmospheric Environment Service
25 St. Clair Avenue, East
Toronto, Ontario M4T 1M2
Attn: Scientific Services

Director, Quebec Region
Atmospheric Environment Service
100 Alexis Nihon Blvd., 3rd Floor
Ville St.-Laurent, P.Q. H4M 2N6
Attn: Scientific Services

Director, Atlantic Region
Atmospheric Environment Service
1496 Bedford Highway
Bedford, Nova Scotia B4A 1E5
Attn: Scientific Services

Canadian Climate Centre:
Assistant Deputy Minister
Atmospheric Environment Service
4905 Dufferin Street
Downsview, Ontario M3H 5T4
Attn: Climatological Services Division

Remittances by cheque or money order should be made payable to the Receiver General for Canada. For a list of publications send for a copy of Selected Publications in Climatology and Applied Meteorology.